KAB STUDY AMONG VOLUNTARY BLOOD DONORS REGARDING THEIR AWARENESS AND WILLINGNESS TO JOIN STEM CELL REGISTRY AND TO DONATE HEMATOPOIETIC STEM CELLS

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CERTIFICATE

This is to certify that the dissertation titled **"KAB STUDY AMONG VOLUNTARY BLOOD DONORS REGARDING THEIR AWARENESS AND WILLINGNESS TO JOIN STEM CELL REGISTRY AND TO DONATE HEMATOPOIETIC STEM CELLS**" is the bonafide original work of **Dr. S.USHA** in partial fulfillment of the requirements for **M.D. Branch – XXI (Immunohaematology & Blood Transfusion)** Examination of the Tamil Nadu Dr. M.G.R Medical University to be held in April 2017.

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DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation titled **"KAB STUDY AMONG VOLUNTARY BLOOD DONORS REGARDING THEIR AWARENESS AND WILLINGNESS TO JOIN STEM CELL REGISTRY AND TO DONATE HEMATOPOIETIC STEM CELLS"** is the bonafide and genuine research work carried out by me under the guidance of **Dr. S.Y.JAGANNATHAN, M.D. (Path)**, Associate Professor**,** Department of Transfusion Medicine, The Tamil Nadu Dr. M.G.R. Medical University, Chennai.

This dissertation is submitted to **The TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI** in partial fulfillment of the University regulations for the award of **M.D.** degree in **IMMUNOHAEMATOLOGY & BLOOD TRANSFUSION**.

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ABSTRACT

BACKGROUND AND AIM

Unrelated HSC donor registries in India require donor-pool expansion. Voluntary blood donors are suitable for motivation regarding unrelated HSC donation. The aim of the study was to assess the knowledge, attitude and behaviour (KAB) regarding hematopoietic stem cell (HSC) donation and unrelated HSC donor registry among voluntary blood donors in Chennai.

MATERIALS AND METHODS

422 voluntary blood donors over a period of one year (July 2015 - June 2016) were interviewed individually as per study questionnaire. Level of knowledge was categorized as “desirable” and “below desirable” based on response to 6 questions. Attitude was assessed based on willingness for HSC donation, prior to and after providing information on HSC donation and unrelated HSC donor registry. Behaviour was assessed by registration status at an unrelated HSC donor registry. Data analysis was done using SPSS software. Categorical data was expressed in frequency and percentage. Chi-square test was used to find association between donor-related factors and willingness for unrelated HSC donation.

RESULTS

Among 422 voluntary blood donors, 417 donors had “below desirable” level of knowledge. Majority (224 donors) were not sure of their decision about HSC donation, initially. After providing information, 151 donors

expressed willingness for unrelated HSC donation. Major reason among those who did not have a positive attitude about HSC donation was concern about adverse events after HSC donation. 139 donors responded that others' opinion would influence their attitude towards HSC donation, of which, 79.9% of them considered the opinion of family members as important. 3 donors had already registered at an unrelated HSC donor registry.

Level of knowledge was significantly associated ($p = 0.028$) with willingness for unrelated HSC donation. Factors which were not significantly associated with willingness for unrelated HSC donation were age, gender, marital status, education, number of units of blood donated, prior plateletpheresis donation and having a known person who needed HSCs as treatment.

CONCLUSION

Awareness programmes and recruitment drives have to be intensified among voluntary blood donors in order to enrol them as volunteers for unrelated HSC donation. Involving persons who have already donated HSCs and key persons like family members of potential volunteers, may be useful strategies for motivation regarding unrelated HSC donation.

Keywords

Knowledge, attitude, willingness, behaviour, hematopoietic stem cells (HSCs), donation, registry, unrelated, voluntary blood donor

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

AIDMR	Asian Indian Donor Marrow Registry
ALL	Acute lymphoblastic leukaemia
AML	Acute myeloid leukaemia
BMCDT	Bangalore Medical College Development Trust
BMDW	Bone Marrow Donors Worldwide
BTS	Blood Transfusion Service
CD	Clusters of Differentiation
CML	Chronic myeloid leukemia
DGHS	Directorate General of Health Services
DKMS	Deutsche Knochmarkspenderdatei
DNA	Deoxyribonucleic acid
HLA	Human leukocyte antigen
HSC	Hematopoietic stem cell
HSCT	Hematopoietic stem cell transplantation
IDM	Infectious disease marker
KAB	Knowledge, attitude and behaviour
MDR (I)	Marrow Donor Registry (India)
MHC	Major Histocompatibility Complex
MUD	Matched unrelated donor
NMDP	National Marrow Donor Program
PBSC	Peripheral blood stem cell
rhG-CSF	Recombinant human granulocyte colony-stimulating factor
RNA	Ribonucleic acid
SCRI	Stem Cell Registry India
SDF	Stroma-derived factor
TC	Therapeutic cell
UCB	Umbilical cord blood
VCAM-1	Vascular cell adhesion molecule-1
WMDA	World Marrow Donor Association
ZKRD	Zentrales Knochenmarkspender Register Deutschland

INTRODUCTION

INTRODUCTION

Worldwide, about 75 unrelated hematopoietic stem cell (HSC) donor registries are in existence in about 53 countries, including India.[1] The databases of these registries contain a list of Human leukocyte antigen (HLA)-typed individuals who have committed voluntarily to donate HSCs when identified as a potential HLA-match for a patient anywhere in the world seeking unrelated HSC donors for transplantation. Currently, the global database has about 28 million people registered as potential unrelated HSC donors.[1]

In allogeneic HSC transplantation (HSCT), the success rate depends upon the degree of allele-level HLA match between the donor and the recipient.[2] The donor and the recipient have a higher chance of being HLA-compatible when they arise from the same ethnicity.[3] Hence, the amount of representation of a particular ethnic or racial group in these registries is of importance in finding a matched unrelated donor for a patient.[4] Additional challenges faced by registries are donor retirement (unrelated HSC donation is age-restricted), donor's medical suitability at the time of HSC donation, personal withdrawal requests from donor[5] and donor attrition (~10% after a year).[6]

In India, the number of patients potentially curable by allogeneic HSCT is high. The incidence rate of acute myeloid leukaemia and acute lymphoblastic leukaemia is 3.6 and 1.6 per 100,000 persons per year.[7] About 10,000 children are born with thalassemia major each year and the incidence of aplastic anaemia is estimated to be 6000 cases per year.[8] The first allogeneic HSC transplant in India was performed in 1983.[9] Since then, there has been a steady progress with close to a dozen centres in the country currently performing HSC transplants.[9] The number of allogeneic HSC transplants have increased to about 2445 in 2010. Half of these transplants were performed for various types of leukaemia, 26% were for thalassemia and other haemoglobinopathies and 18% of the allogeneic HSC transplants were for aplastic anaemia.[7] The majority of these transplants were performed using patients' siblings as donors of HSCs.[4] However, it has been found that only 39.3% of the patients in India have an HLA-matched sibling donor.[9]

In India, the first unrelated HSC donor registry was launched in 1994 in New Delhi.[10] Subsequently, such registries were also set up in few other states of the country and currently, a total of about 1.5 lakh volunteers have registered as potential unrelated HSC donors. The number of unrelated HSC donations in India have gradually increased to 150 in the last five years since the first such donation in 2011.[11,12] However, the number of requests for unrelated HSC donors have increased from 465 in 2012 to 797 in 2014. There are at least 30 to 50 requests for unrelated HSC donors every month[13] and

close to 1000 patients are waiting to find a matched unrelated donors in India.[12] Given the current registry size in India, the probability of an Indian patient finding a HLA-compatible unrelated HSC donor is higher in the multi-national registry than in the registries in the country. However, dependence on a foreign registry is very costly.[14]

Although umbilical cord blood (UCB) is an alternative source of HSCs for transplantation, it has certain disadvantages like delayed platelet and neutrophil engraftment due to inadequate HSC content, especially, for larger patients, one-time usage from a single donor, limited ability to perform post-transplant donor-derived cellular therapy and expensive infrastructure required for banking.[15] There are only three public cord blood banks in India, storing 5000 units collectively.[16] It has been estimated that even with a UCB registry size of 25,000 units, only 18.3 % of Indian patients would have a 6/6 match.[5] Hence, recruiting more volunteers into the unrelated HSC donor registries in India represents a likely option to bridge the gap between demand and supply of HSCs for transplantation.

The recruitment of potential unrelated HSC donors often takes place in a blood bank.[17] It is presumed that voluntary blood donors have high internal motivation to donate in contrast to the general public who are likely to be subjected to peer pressure to become a part of the registry.[18] Taking part in the blood donation process is said to lead to several real and potential benefits that do not accrue from recruitment approaches to a more general public. It is

presumed that individuals who demonstrate enough altruism to donate blood on a voluntarily non-remunerated basis might be more likely to follow through as HSC donors when called upon.[19] Also, similarity exists between blood and HSC donation in terms of donor eligibility criteria.[20] Recruitment of HSC donors at a Blood Bank also obviates the need for a separate sample collection area from prospective donors or a donor-tracking system for follow-up of the registered donors. Strategy aimed at recruiting voluntary blood donors can yield large numbers of potential unrelated HSC donors.[19]

Many experts in the field of HSCT in India have stated that there is a need for more awareness regarding unrelated HSC donation in the country.[21,14] India is ranked at the eleventh position in the list of the most productive countries in bone marrow research. However, there are limited scientific publications focussing on unrelated HSC donor recruitment activities in the country.[22,7] As per the knowledge, attitude and behaviour (KAB) model, knowledge is a prerequisite to the intentional performance of a health-related behaviour. Information leads to accumulation of knowledge which changes attitude, behaviour, or both.[23] Since voluntary blood donors represent a suitable target for motivation regarding unrelated HSC donation, a study regarding the existing KAB among them would be helpful in formulating strategies to recruit them as potential unrelated HSC donors.

AIM & OBJECTIVES

AIM AND OBJECTIVES

AIM

To study the knowledge, attitude and behaviour (KAB) regarding hematopoietic stem cell (HSC) donation and unrelated HSC donor registry among voluntary blood donors at the Department of Transfusion Medicine, The Tamil Nadu Dr. M.G.R Medical University, Guindy , Chennai.

OBJECTIVES

- To estimate the awareness and willingness of voluntary blood donors regarding hematopoietic stem cell (HSC) donation and unrelated HSC donor registry.

- To compare the willingness of voluntary blood donors before and after providing information about HSC donation and unrelated HSC donor registry.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Blood Transfusion Service (BTS) forms an important part of health care in various medical and surgical specialties. Patients may require blood both in routine and emergency situations. The annual requirement for blood in India is about 10 million units.[24] The backbone of BTS is a blood donor, since the only source of blood to the blood bank is a blood donor.[25] Blood from voluntary, non-remunerated donors is considered to be the safest since they carry lower risk for transfusion-transmitted infections.[26] In 1975, the World Health Organization recognized its value and called on its member states to promote voluntary non-remunerated donations.[27] In India, voluntary blood donation has progressively increased from 54.5% of the donations in 2006 to 79% in 2015-16.[28] Voluntary blood donation contributes to more than 80% of the blood collected in Tamil Nadu.[24]

VOLUNTARY NON-REMUNERATED BLOOD DONOR[29]

- A person who gives blood, plasma or other blood components of his/her own free will and receives no payment for it, either in the form of cash or in-kind which could be considered a substitute for money. This includes time off work, other than reasonably needed for the donation and travel. Small tokens, refreshments and reimbursement of

the direct travel costs are compatible with voluntary, non-remunerated blood donation.

- "Voluntary" blood donation refers to "unpaid, non-remunerated" blood donation.

- An altruistic donor who gives blood freely and willingly without receiving money or any other form of payment.

Categories of voluntary blood donor [29]

a. **New voluntary donor** - A voluntary non-remunerated blood donor who has never donated blood before.

b. **Lapsed voluntary donor** - A voluntary non-remunerated blood donor who has given blood in the past but does not fulfill the criteria for a regular donor.

c. **Regular voluntary donor** - A voluntary non-remunerated blood donor who donates blood on a regular basis without any break for a longer duration between two donations. i.e., at least three times, the last donation being within the previous year, and continues to donate regularly at least once per year.

THEORIES OF BLOOD DONATION

Many sociological and psychological theories exist which explain why and how an individual decides to donate blood. Some theories also attempt to explain repeat donation of blood.

The various theories of blood donation are [26]

a. **Opponent-process theory:** Donors experience a "warm-glow" after donation, which may be an opponent process in response to negative feelings experienced before and during initial donations. This theory explains why some donors repeat the process of blood donation.

b. **Attribution theory:** It suggests that people who have taken an action (eg, donating blood) without external coercion or large reward, are likely to attribute to themselves a predisposition toward that action and so, they are more likely to repeat that action, in future.

c. **Model of commitment** : It encompasses processes like coping with and neutralizing the negative aspects of donation, developing internalized motives for donation, developing a behavioural intention to continue giving blood and forming a self-sustaining habit of donation.

d. **The theory of reasoned action:** All behavior is preceded by a behavioural intention that can be measured by seeking an estimate of

the probability of acting on that specific behavior. Intention is influenced by the individual's attitude toward performing the act and the perceived expectations of others.

e. **Theory of planned behaviour:** The theory of planned behaviour has been the main psychological framework applied to study blood donation behaviour. It states that behaviour is determined by intentions to act and intentions are predicted by subjective norms, attitudes, and perceived behavioural control.

RECRUITMENT OF VOLUNTARY BLOOD DONORS

One of the most important functions of a blood bank is to recruit adequate numbers of voluntary blood donors to ensure adequate supply of blood to provide for patient needs. Recruitment campaigns generally focus on altruism, as voluntary blood donation is considered an archetypal altruistic act and altruism is the most common self-reported motive for blood donation.[30]

The theory-driven motives for altruistic behaviour which are differentially related to blood donation are [30]

a. **Pure altruism:** It describes an individual's ultimate desire to help others at a personal cost, without reward.

b. **Warm glow:** It describes the personal benefit arising through positive emotional gains from the act of donation.

c. **Reluctant altruism:** It describes when co-operation occurs due to a lack of trust that others will donate.

d. **Social responsibility:** It reflects a sense of duty to donate blood.

e. **Hedonism:** It is an egoistic motive, whereby helping is used to increase personal gains without concern for the recipient's welfare.

f. **Reputation building:** It operates via indirect reciprocity, with people more likely to help those who have a good reputation for helping.

g. **Kin selection:** Individuals show preferential helping towards family members.

VOLUNTARY BLOOD DONOR AS UNRELATED HEMATOPOIETIC STEM CELL DONOR

Unrelated hematopoietic stem cell (HSC) donation is an act of altruism.[31] Volunteerism is one of the basic principles of becoming an unrelated HSC donor. At the time of recruitment, emphasis is made on the voluntary nature of the donation.[32] The recruitment of a potential HSC donor occurs in a number of places including a blood bank.[17] Initially, most persons joining unrelated HSC donor registries were recruited from plateletpheresis panels but the potential of enrolling voluntary whole blood donors was explored and it was found that those who were willing to join the registries had history of frequent whole blood donations.[19] HSC donation requires a

much higher level of commitment that that associated with blood donation.[33] Regarding medical suitability for HSC donation, HSC transplantation has the potential to transmit blood-borne illnesses which are inclusive of those conditions screened prior to blood transfusion.[31] Potential donors of HSCs are evaluated using selection and exclusion criteria which include those applicable to donors of blood and blood components.[20] In June 2008, a pilot project was conducted in Bengaluru, India to enrol voluntary unrelated HSC donors from voluntary whole blood donors. 24.79% of the voluntary whole blood donors had registered as potential HSC donors after receiving appropriate information.[34] Thus, voluntary whole blood donors are potential target groups for recruitment as unrelated HSC donors.

HSC DONATION

HSCs are donated for transplantation with the intention of repopulating and replacing the hematopoietic system in total or in part.[35] The principles of HSC donation and transplantation are based on the biology of HSCs.

Hematopoietic stem cells (HSCs)

HSCs are one of the longest studied somatic stem cells.[36] They originate during the third wave of hematopoiesis in the embryo and eventually seed the bone marrow which is the primary site of its maintenance, postnatally.[37,38] Hematopoiesis becomes restricted to the flat bones and the proximal ends of humerus and femur by about 20 years of age.[39] The

properties of HSCs are multipotency, quiescence and self-renewal allowing for long life span, ability to maintain an undifferentiated state in the HSC niche and long-term repopulation, with the ability to engraft in vivo and reconstitute hematopoietic tissue upon transplantation.[40] Human HSCs are enriched in the Lin− CD34+ CD38− CD90+ population of hematopoietic cells[41]

ALLOGENEIC HSC TRANSPLANTATION (HSCT)

HSCT is termed “allogeneic” when the patient receives HSC graft from a healthy donor.[42]

Historical aspects

The earliest attempt to use marrow for therapy was in 1939 when few millilitres of marrow were infused intravenously to a patient diagnosed with aplastic anaemia but was not met with any success. Following World War II, murine experimental studies revealed that the bone marrow contained cellular component which, upon transplantation, was capable of rescuing lethally irradiated mice. This led to clinical experiments in human beings diagnosed with haematological malignancies. The first allogeneic HSCT was performed by E. Donnall Thomas in 1957, at a time when little was known about Human leukocyte antigen (HLA). The survival rate was not satisfactory. However, he continued his clinical trials in patients laying the foundation for the principles currently followed in HSCT. Allogeneic HSCT has evolved in many ways

since the 1950s; in terms of indications, conditioning regimens, graft and donor sources.[42,43] In India, the first successful allogeneic bone marrow transplantation was done in 1983.[9]

Indications for allogeneic HSCT

Leukaemia and myeloid malignancies [acute myeloid leukaemia (AML), acute lymphoblastic leukaemia (ALL), myelodysplastic syndromes and myeloproliferative disorders] are the most common indications for allogeneic transplants. The most common non-malignant indications include aplastic anaemia and other bone marrow failure states, hemoglobinopathies like thalassemia, severe combined immunedeficiency and metabolic disorders involving hematopoietic cells.[44] In patients with severe aplastic anaemia, AML, ALL, or CML who survived 2 years post-transplant, survival at 5 years post-transplant was 89%. The risk of death of survivors who underwent transplantation for severe aplastic anaemia had returned to that of the normal population, matched for age, sex, ethnicity, and nationality, by the sixth year post-transplant.[45]

HSC collection from bone marrow and peripheral blood

HSCs can be collected from the bone marrow and peripheral blood.

Bone marrow donation

Bone marrow is the obvious source of HSCs and was the mainstay for transplantation for many years.[46] Marrow still accounts for about 25% of the transplants for allogeneic recipients.[47]

It is an invasive surgical procedure done under general or regional anesthesia.[48] Brief hospitalization was necessary previously but it is now possible to collect marrow as an outpatient procedure. The volume of marrow donated is based on the target cell dose (between 2 and 5 X 10^8 nucleated cells/kg and between 2 and 5 X 10^6 CD34+ cells/kg of recipient weight) for the transplant.[49] A maximum of 20 ml/ kg of donor weight is permitted. About 1 to 3 autologous blood units are collected from almost all donors prior to the procedure.[48] The syringes are heparinized with 1 mL of a 100 U/mL heparin solution. 1000 to 1500 mL of marrow is typically collected, 3 to 10 mL at a time, from multiple punctures of the posterior iliac crests. The marrow is drained into a collection apparatus that contains a filter to remove bone chips, clots, fat, and fibrin. It also contains heparin at a concentration of at least 10 U/mL in the final product.[49]

Adverse events of marrow donation

The most common symptoms are pain (at the collection site and lower back) and fatigue. Pain may also occur at the bandage and intravenous site or while sitting and is mostly of mild grade. Nausea, vomiting and sore throat are common with general anaesthesia. Other symptoms are headache and fever. 87% of the donors recover completely within 1 month after donation.

Minor complications occur in 6% to 20% of marrow donations and include transient hypotension, syncope, severe post-spinal headache, excess pain, unexpected hospitalization, and minor infections.

Serious complications occur in 0.1%-0.3% of the donations and the risks are of various categories. Anaesthetic risks due to reactions to anaesthetic agents (hypersensitivity reactions, malignant hyperthermia, arrhythmias), hypotension and problems with intubation or intravenous catheter insertion. Risk of major infections at the site of marrow collection, line insertions or at distant sites, e.g., pneumonia. Antibiotic therapy also carries risk of adverse reactions. Risk of mechanical injuries like bone damage, nerve damage or entry of a collection needle into a blood vessel, an organ or the spinal canal. Hemorrhage can cause pain from compression of soft tissues. Decrease in haemoglobin leading to 76% of the donors receiving at least 1 autologous red blood cell unit during or shortly after marrow harvest. The likelihood of needing allogeneic blood transfusion is

0.25%.Other haematological changes like mild increase in WBC values and decrease in platelet counts immediately post-donation return to baseline values, one month post-donation.

Pregnancy is considered an absolute contraindication to marrow donation for unrelated recipients.

The risk of death with marrow donation is estimated to be ~1 in 10,000.Two of the six reported deaths in marrow donors were due to cardiac arrest and occurred before the donation procedure could be done. The remaining 4 were from ventricular fibrillation, respiratory arrest, myocardial infarction and pulmonary embolism. [48,50]

Peripheral blood stem cell (PBSC) donation

The peripheral blood of healthy individuals has less than 0.1% HSCs.[49] However, various pharmacological agents can mobilize HSCs from the marrow and increase their numbers in the peripheral blood which can then be collected by apheresis. Over the past two decades, this has become the preferred route of HSC collection, accounting for about 70% of unrelated adult donations.[31]

Recombinant human Granulocyte-colony-stimulating factor (rhG-CSF) is the most commonly used agent.[51] It is available in various forms but the non-glycosylated form is the agent of choice in normal donors. During G-

CSF-induced mobilization, granulocyte proteases are released in large amounts in active form in the marrow stroma which inactivate the factors retaining HSCS within the marrow like Stroma-derived factor (SDF)-1 and its receptor, vascular cell adhesion molecule-1 (VCAM-1) and c-Kit receptor.[52] A small proportion of healthy allogeneic donors do not mobilize adequately, especially, when there is a major weight discrepancy between donor and recipient. Novel mobilizing agents are being investigated to overcome this problem.[53]

PBSC donors receive subcutaneous injections of G-CSF once in a day at a dose of 5 to 20 µg/kg .Total white cell count and CD34 percentage are measured to determine the optimal time to donate, which is usually on the fifth day after initiation of G-CSF.[48] PBSC donation is mostly an outpatient procedure.[54] Through peripheral venous access, leukapheresis is performed which removes the buffy coat containing HSCs and returns the red cells, plasma and platelets back to the donor.[31] Central venous access is needed in case of poor vascular access or multiple apheresis procedures.[54] The volume of whole blood processed is about 12 to 24 litres per donation. If the required number of cells are not collected, the donor may be asked to donate again the next day.[48]

Adverse events of PBSC donation

Symptoms are mostly related to the use of G-CSF. Majority (97%) of the donors develop mild to moderate bone pain which is mostly[48] diffuse but may be prominent in the spine, hips or pelvis, and ribs and resolves promptly when G-CSF is discontinued or with non-narcotic analgesics.[50] Other symptoms are myalgia, headache, insomnia, flu-like symptoms, sweating, anorexia, fever, chills, and nausea and are mostly mild in nature.[54]

Minor apheresis-related adverse events occur in about 20% of the donors.[54] Bruise, hematoma and minor bleeding are related to securing venous access at antecubital veins. Symptoms of hypocalcemia (perioral numbness, paraesthesia and carpopedal spasm) requiring oral or parental calcium supplementation are due to anticoagulant Acid Citrate Dextrose used in apheresis.[50]

G-CSF administration causes dramatic increase in the peripheral blood leucocyte counts, especially, neutrophils and modest decrease in platelet counts. Post-donation, mild neutropenia, lymphopenia and anaemia are common for a few weeks. Decrease in platelet count by 20-30% is the most significant finding which begins to recover 3 to 4 days after donation. Long-term follow-up studies have not suggested any increased risk of haematological malignancy.[31,50]

Complications due to central venous catheter placement due to poor peripheral venous access (up to 20% of donations) include pneumothorax, haemorrhage and infection but are uncommon. Complications of G-CSF administration include precipitation of sickle crisis (in sickle cell anaemia or complex sickle cell haemoglobinopathy patients), flares of autoimmune disorders like rheumatoid arthritis and ankylosing spondylitis, inflammatory conditions of the eye (marginal keratitis, episcleritis and iritis), increase in spleen length and width or rarely, spontaneous splenic rupture. Anaphylaxis to G-CSF has been documented and the risk is said to be 1 in 10, 000. G-CSF administration is contra-indicated in pregnant women.

The risk of death does not appear to be higher than with marrow donation. The few deaths which have been reported were due to hemothorax, sickle crisis, stroke and cardiac arrest. In many of these donors, pre-existing medical conditions were identified post-mortem.[31,50]

Psychosocial effects of HSC donation

Donors who have undergone HSC donation were reported to be generally positive about the donation one year later; 87% of them considered the donation "very worthwhile". Donors with longer collection times, had less positive psychosocial outcomes and those donors who experienced lower back pain or difficulty walking were more likely to experience the donation as more stressful and painful than expected.[18]

HISTOCOMPATIBILITY IN ALLOGENEIC HSCT

Genetic polymorphism of the HLA system is the most important barrier in allogeneic HSCT.[55] The HLA system is paramount with regard to graft rejection and graft-vs-host disease (GVHD).[56]

The HLA System

Historical Aspects

In 1952, the existence of white cell antigens was first suggested and in 1958, leukocyte antibodies were identified by Jan Dausset and Payne, through independent studies in the serum of multiply-transfused and in postpartum women, respectively.[57] The term "HLA" was derived by combining the human-1 (*HU-1*) and leukocyte antigen (*LA*) designations used by them, respectively, to describe the newly discovered leukocyte antigen system.[58]

Genetics of HLA system

A series of closely linked genes at position p21.3 on the short arm of chromosome 6 [56] constitute the Human leukocyte antigen (HLA) or Human major histocompatibility (MHC) complex.[58]

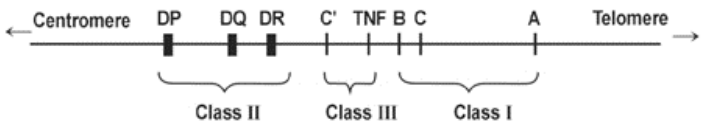


Fig. 1: Human Major Histocompatibility complex (MHC) [110]

The Class I region consists of classical and non-classical genes. The classical genes (*HLA-A, -B* and *-C*) encode Class I antigens. The non-classical genes (*HLA-E, HLA-F, HLA-G, HLA-H, HFE, HLA-J, HLA-K, HLA-L, MICA* and *MICB*) are expressed at lower levels and appear to have more limited functions in the immune system. The Class II region consists of *HLA-DR, HLA-DP, HLA-DQ* loci that encode Class II antigens. Several β-chain loci and one α-chain locus encode the HLA-DR antigens. The DRB1 locus is responsible for the DR1 to DR18 specificities, whereas the DRB3, DRB4, and DRB5 loci are responsible for the DR52, DR53, and DR51 specificities, respectively. The DQA1 and DQB1 loci encode the HLA-DQ specificities. The genes DPA1 and DPB1 encode the HLA-DP specificities. Several pseudogenes and genes with important accessory functions to Class I and II antigen presentation are also present in this region. The Class III region is not part of the HLA system and is located between Class I and Class II region. [56,57]

Structure of HLA antigens

HLA antigens are cell-surface globular glycoproteins.[59] The Class I and II HLA antigens differ not only by gene locus but also by function, tissue distribution and biochemistry.[56]

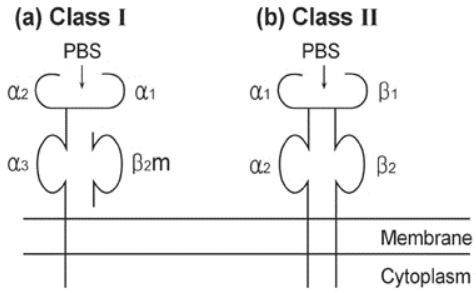


Fig.2: Schematic diagram of HLA molecules. PBS (peptide-binding site)[110]

Class I HLA antigens

HLA -A, -B and -C antigens have a molecular weight of about 57,000 Daltons and are found on platelets and most nucleated cells of the body except neurons, corneal epithelial cells, trophoblasts and germinal cells . They are made up of two types of chains linked by non-covalent bonds. The heavy chain is an integral membrane protein and its external portion contains α1, α2 and α3 domains. The α1 and α2 domains contain the majority of polymorphic regions that confers serological antigen specificity. The light chain (i.e., β2 microglobulin) is encoded by gene in chromosome 15. [56]

Class II antigens

HLA-DR,-DQ and -DP antigens have a molecular weight of 63,000 Daltons and are expressed constitutively on B lymphocytes, monocytes, macrophages, dendritic cells, intestinal epithelium, endothelial cells of microvasculature, activated T lymphocytes and early hematopoietic cells. They are made up of two integral membrane proteins, alpha and beta. The

outermost portion of the molecule (alpha 1 and beta 1) contains the variable regions. The outermost domain of the HLA molecules containing the antigenic epitope, forms the "peptide-binding groove". Alleles defined by HLA gene polymorphisms encode unique amino acid sequences forming unique binding grooves that bind to unique peptide sequences. [56]

Functions of HLA system

T lymphocytes interact with peptide antigens only when they are presented in the context of an MHC molecule (Class I for CD8 and Class II for CD4 T lymphocyte), a process called "MHC restriction".[56] The HLA system is important for self/non-self discrimination. Recognition of HLA allelic differences between the donor and recipient by T lymphocytes confers a higher risk of acute graft-versus-host disease and mortality in allogeneic HSCT.[60]

Nomenclature of the HLA system

a. HLA antigens

Each serologic specificity is prefixed by the genetic system designation HLA-, followed by a letter denoting the encoded antigen (e.g., A, B, C, DR, or DQ) and then, a digit indicating the specificity.[57]

b. HLA alleles

For Class I alleles, because only the α chain is variable, the molecular designation is the system (HLA-), the locus (A, B, or C), an asterisk (∗), followed by up to four sets of digits separated by colons. All alleles receive at least a four-digit name. The first set of digits corresponds to the serologic specificity. The third and fourth sets of digits are employed to designate alleles with silent polymorphisms or with variation occurring outside exons. In the Class II region, the locus designation includes the polypeptide chain responsible for the allele.[57]

Inheritance of HLA system

HLA genes follow Mendelian pattern of inheritance and are autosomal and codominant. They are inherited in units known as haplotypes. Every person has two HLA haplotypes, one from each parent. The phenotype is the combined expression of both haplotypes. Inspite of linkage, crossover can happen during meiosis at a low rate leading to new haplotypes in the offspring. [56,57]

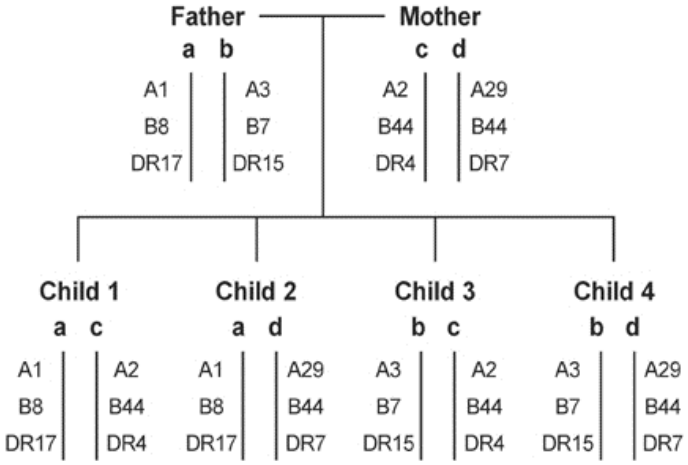


Fig. 3: Mendelian inheritance of HLA haplotypes demonstrated in a family study[110]

Polymorphism of HLA genes

HLA system is the most polymorphic genetic system in humans. HLA-A,-B, and -C loci are all highly polymorphic, with 2800 to 4100 known alleles. HLA-DRB1 locus is highly polymorphic, with more than 1800 known alleles. The other Class II region loci have similar but less extensive polymorphism. The exons in which most of the polymorphism in the Class I (exons 2 and 3) and Class II (exon 2) genes occurs encode the outermost domains. New alleles emerging due to events like point mutation can become fixed in populations. Due to linkage, many haplotypes are overrepresented compared with what would be expected by chance in view of its polymorphic nature. This is called “linkage disequilibrium” and it makes finding HLA-identical individuals within a population possible for unrelated HSCT. HLA allele and haplotype frequencies exhibit ethnic variation. [56,57]

HLA typing for HSCT

DNA-based methods like sequence-specific oligonucleotide probe hybridization, sequence-specific primer polymerase chain reaction, sequence-based typing and next-generation sequencing are used for typing of HLA alleles for HSCT.[57]

Various levels of resolution of HLA typing are [55]

a. **Low resolution typing -** the alleles are designated by 'first-field level' i.e., the two digits preceding the first separator. It is also called "antigen level typing"

b. **Intermediate resolution typing -** the alleles are defined at the 'second-field level'.

c. **High resolution typing -** the alleles are designated by 'second - and third -field level' names (i.e., ≥2 digit numbers preceding, respectively, the second and third separators).

d. **Allele level typing -** refers to the unique nucleotide sequence for a gene. Alleles are designated by using all digits in the first, second, third and fourth fields.

HLA MATCHING IN ALLOGENEIC HSCT

In allogeneic HSCT, HLA typing is done to determine histocompatibility between a donor and the recipient.[4] HLA matching is based on exons 2 and 3 polymorphism for class I loci and on exon 2 polymorphism for class II loci.[61] A "matched" donor may be defined on the basis of high-resolution allele definition at four loci-HLA-A, B, C, DRB1 ("8/8") - or five loci - HLA-A, B, C, DRB1, DQB1 ("10/10")[62] and more recently, at HLA-DPB1 locus additionally("12/12").[4,55]

HLA matched sibling donor

HSCs are collected from a HLA-identical sibling of a patient.[35] The probability of identifying such a donor depends on the number of siblings. The chance of a patient with "n" siblings having at least one HLA- identical sibling is $1 – (3/4)^{n}$ and is 25% for patients with one sibling. Thus, having two siblings provides a 44% chance, and having three siblings provides a 58% chance, 68% for those with four and up to 90% chance for those with eight siblings.[55] Every time a new sibling is tested, that new sibling has only a 25% chance of being a match.[56]

Matched unrelated donor (MUD)

HLA-genotypically identical sibling donors are the gold standard for allogeneic HSCT[55] since such they are identical not only for the polymorphisms detected by HLA typing but also for all other polymorphisms in the MHC complex.[60] However, only 30% patients have such a donor.[55] Small family size is one of the major limitations in finding HLA-matched sibling donors[63] and those lacking a sibling donor must seek donations from unrelated persons in the general population.[3] In the context of unrelated individuals, matching is defined only with respect to the polymorphisms encompassed by the testing.[60] HSCT using such donors is of the greatest benefit to the recipients if performed when the leukemic burden is lowest and when the procedure can be tolerated.[62] The probability of identifying a matched unrelated donor depends upon the ethnic origin of patients and on the matching grade required by the transplant centre.[55] The availability of donors for unrelated allogeneic HSCT is made possible by the establishment of registries.[64]

UNRELATED HSC DONOR REGISTRY

A registry is a national organization whose responsibility is to process requests for unrelated donors of HSCs[65] Its major goal is to create a file of well-informed and well-selected volunteers, with the greatest likelihood of being suitable donors if chosen for specific patients.[66] The registry has a fixed

physical location[67] and is a legal entity or is contained within a legal entity operating within the country to which it belongs.[68] The registry coordinates the activities of Donor, Collection, and Transplant Centres in the respective country.[65]

Historical aspects

In 1971, a child named Anthony was born in United Kingdom with Wiskott–Aldrich syndrome. His only hope for cure was bone marrow transplant but he did not have HLA-matched donors within his family. In 1973, the first successful unrelated donor transplant was performed on a child. This gave Anthony's mother, Shirley, an idea that would benefit all patients who desperately needed an unrelated donor. In 1974, she started the Anthony Nolan Bone Marrow Register in Westminster Children's Hospital, where Anthony was a being treated.[69] The HLA type of volunteers was recorded and listed in an accessible format in the event that the donor's type might match that of a patient in need of a transplant.[14,64] Though the register grew throughout the seventies, it couldn't help Anthony Nolan who died in 1979. However, it paved the way for similar projects in the United States and worldwide.[64]

Fig. 4: Worldwide location of unrelated donor registries[64]
(Star symbol indicates location of registries)

In 2010, there were a total of 9 unrelated HSC donor registries in North America, 47 in Europe, 2 in Africa, 11 in Asia, and 2 in Australia.[64] The National Marrow Donor Program (NMDP) in the United States and Zentrales Knochenmarkspender Register Deutschland (ZKRD) in Germany list more than 1 million volunteer donors.[70] The largest bone marrow registries in Asia are in Japan and Taiwan.[3] In 2012, the German registry Deutsche Knochmarkspenderdatei (DKMS) set the Guinness World Record for the most bone marrow donors (2,976) recruited in 24 hours. [71]

Unrelated HSC Donor Registries in India

In India, almost all the unrelated HSC donor registries are run by non-governmental organizations. A proposal to create donor registry as part of the National Health Mission is being evaluated by the Health ministry.[72]

a. Asian Indian Donor Marrow Registry (AIDMR)

AIDMR was launched in 1994 in association with Dadhichi Deh Dan Samiti at the All India Institute of Medical Sciences, Delhi.[10] It is the first and the oldest registry in India[6] and also the first-of-its-kind initiative by any public hospital in the country.[73] It has about 3925 registered donors and gained impetus when it was relaunched in August 2014.[10]

b. DATRI Blood Stem Cell Donors Registry

DATRI is a not-for-profit organization set up in 2009 by Mr. Raghu Rajagopal, along with HLA typing experts Dr. Nezih Cereb and Dr. Soo Young Yang.[6] It facilitated India's first voluntary peripheral blood stem cell donation in April 2011 by Mr. Ajit Kumar Das from Odisha.[11] It is actively involved in organizing regular campaigns and recruitment drives across the country.[12] It has become the largest registry in India with more than 1,22,150 registered donors from various ethnic backgrounds.[11,12] It has facilitated 150 donations as of March 2016.[12] It is a member of World Marrow Donor Association and is also registered with Bone Marrow Donors Worldwide (BMDW).[74]

c. Marrow Donor Registry (India) [MDR (I)]

MDR (I) was launched at Tata Memorial Hospital, Mumbai, with haematologist Dr Sunil Parekh as its founding member and chairman. From a

mere 889 donors in 2009, the registry size has grown to more than 25,000 registered donors as of May 2015.[75] MDR (I) launched its Gujarat chapter in July 2014 along with Indian Red Cross Society and Gujarat Cancer Hospital.[76] MDR (I) is registered with BMDW.[1]

d. "Life de India" Stem Cell Registry India (SCRI)

Bangalore Medical Services Trust, a not-for-profit organization of the Rotary Club of Bangalore and TTK group of companies, started the "Life de India", Stem Cell Registry India (SCRI) project in 2009 with an aim to motivate voluntary blood donors to register as potential bone marrow donors. More than 5000 have joined the registry.[77]

e. Bharat Stem Cell Registry

Bharat Stem Cell registry was set up in 2012[6] and has its base in Delhi. It is an initiative of Safe Blood Organisation, a non–profit organisation.[78] It has 3,500 registered donors as of July 2015[13] and is registered with BMDW.[1]

f. Jeevan Stem Cell Registry

It was launched in May 2015 by Jeevan Blood Bank and Research Centre in Chennai with a target of recruiting 50,000 donors over a five-year period from a pool of voluntary donors across the country who have donated blood or platelets twice in the previous two years.[79]

g. BMCDT Bone Marrow Registry

The Bangalore Medical College Alumni Association formed The Bangalore Medical College Development Trust (BMCDT) in May 2015 with an aim to enrol donors through its bone marrow registry committee. Within three weeks of its launch, around 100 donors were registered after conducting awareness drives in Bangalore.[80]

STRATEGIES TO RECRUIT AN UNRELATED DONOR

Joining the registry implies a general offer to be available for any patient in need of a HSCT anywhere in the world, irrespective of the patient's age, gender, nationality, creed or ethnicity.[81] The minimum age to join the registry is as per the national laws governing general anaesthesia and blood donation or is 18 years of age, if no such regulations exist. The maximum age is as per the policy of the registry and should not exceed 60 years after which donors will be removed from the registry.[67] Donation of HSCs is not remunerated but incurred expenses may be reimbursed.[81] The decision to join the registry is the individual choice of the adult donor.[50] The decision to proceed to donation after being confirmed as a match is also purely voluntary and non-remunerative. Identity of both the donor and patient is kept confidential during the entire search and donation process allowing the donor to make an unbiased decision. However, the volunteer donor has the right to withdraw at any stage.[81] In terms of risks and inconveniences to the donor,

HSC donation is placed on a middle ground between blood donation and living solid organ donation. Considerable time gap (~ 8 years) may occur between recruitment and identification as a potential match and repeated donations may be requested for a patient. The donors may forget that they had registered earlier or refuse to donate or refuse repeated donations.[82] Valid written consent obtained after providing information in a graded manner at each stage solicits a graded commitment from the donor.[81] Strategies for recruitment of an unrelated donor takes into account the particularities of HSC donation.[82]

Target group for recruitment

Early strategies targeted HLA-typed platelet donors. However, family members of bone marrow transplant recipients, regular blood donors[19] and the general public[83] became subsequent targets for recruitment. Young donors are targets to the registry because they remain in the registry for a longer duration[84] and also due to evidence indicating more favourable transplantation outcomes for transplants using younger donors.[85]

Types of donor recruitment drives

The types of donor drives are [83]

a. **Family drive -** initiated by a person with a family member who needed a HSCT.

b. **Minority drive** - initiated by a family but aimed at recruiting potential donors who are members of a specific minority group.
c. **Organization drive** - initiated by corporations, community service groups or units of government.

Place of recruitment

In many registries, an established structure called the "Donor Centre" is responsible for recruitment of prospective donors[65] It is often a blood bank or a transfusion centre, but it can be any suitable organisation. Recruitment is also organised at external sites where health history questionnaires are filled out and blood/buccal swab samples collected. Alternatively, potential volunteers are also counselled over phone and then directed to a specific hospital for giving samples.[17] Online registration of volunteers is also available.[74]

Medium for motivation

Printed material (leaflets, posters, etc.), media (radio, TV, newspapers, magazines), verbal presentations, information on telephone lines and videos, electronic mail, the world wide web are utilized for making rational or emotional appeals to potential volunteers.[81,86] Celebrities have also been identified by certain registries as Brand ambassadors to promote motivation.[76] The third Saturday of September has been officially declared as "World Marrow Donor Day" since 2016. It is celebrated in 52 different countries

throughout the world with the aim of raising awareness among the general public and decision-makers about being a stem cell donor and the impact of blood stem cell transplantation on patients' lives.[87]

Support from the Government

Leave and/or tax benefits for HSC donors and financial support to the registry have been demonstrated to have a positive effect on HSC donation and are crucial for enhancing HSCT programs.[88]

DONOR MEDICAL SUITABILITY

Medical evaluation of a donor is done is to identify those conditions that may increase the risk to either the donor or the recipient. HSCT has the potential to transmit the same range of blood-borne infections as blood transfusion. Certain hematological malignancies, autoimmune and inherited conditions have also been reported to be transmitted through HSCT.[31] The intensity of the assessment differs at each stage. The donor has the right to receive the results of medical assessment.[67]

Table 1: Conditions leading to permanent deferral of unrelated HSC donor[66]

Systemic Hypertension (systolic > 180 mm Hg or diastolic > 100 mm Hg Asthma Intervertebral disc problem Malignancy (current/past) Chronic inflammatory diseases History of cerebrovascular diseases, Haemophilia, von Willebrand disease, Mental health problems Drug abuse Diabetes mellitus, glaucoma History of coronary disease, angina pectoris, severe cardiac arrhythmia	Latex allergy Serious liver disease , Cirrhosis or Wilson's disease Solid organs or HSC transplantation Systemic autoimmune diseases History of severe trauma of head and central nervous system Infections (Babesiosis, Chaga's disease, Creutzfeldt-Jakob disease, HTLV I/II infections, Leishmaniasis , Leprosy, Chronic Lyme disease, meningitis, Q fever, Typhus, Hepatitis B and C virus , HIV

Table 2: Conditions leading to temporary deferral of unrelated HSC donor[66]

Endoscopy with biopsy using flexible instruments Epilepsy Fever above 38 °C flu-like illness Kidney disease/acute glomerulonephritis Medication Piercing (body, skin, ear)/ Tattoo	Pregnancy/abortion Rheumatic fever Surgery Blood Transfusion Prophylactic immunizations with attenuated bacteria and viruses Infections (Malaria, Osteomyelitis, Syphilis Tropical diseases, Tuberculosis, Brucellosis, Toxoplasmosis)

SEARCH FOR AN UNRELATED DONOR IN THE REGISTRY

The process of identifying a suitable unrelated donor to donate HSCs for a patient in need of transplant is called "search".[89] The donor selection criteria like donor age, gender, HLA compatibility etc., is determined as per the protocol of the requesting transplant centre.[90] The registry responds to the request and facilitates the process using search algorithms like OptiMatch, HapLogic incorporated as the key element into its software system. A list of potential donors is provided with the donors most likely to be an optimal stem cell source for the patient present at the top of the list. [91]

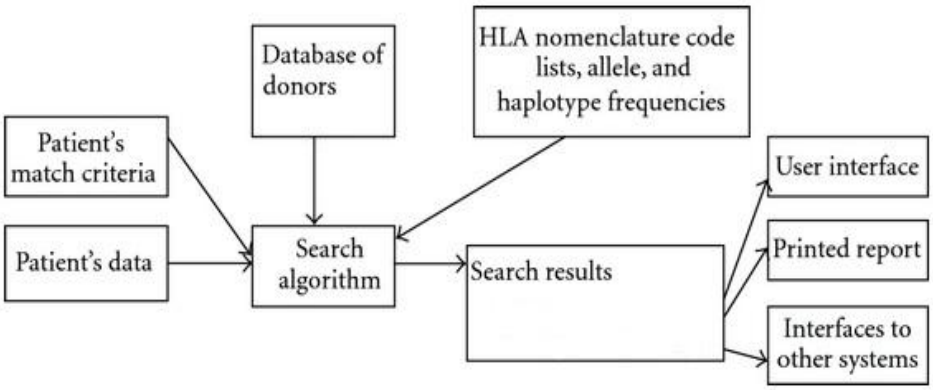


Fig. 5: Basic concept of the donor search algorithm[91]

"Preliminary search" identifies the presence or absence of potential matched donors so that a decision to go ahead with transplantation can be made. A "formal search" is when the transplant physician requests additional HLA typing on the potential HLA-compatible donors identified during the preliminary search process and receives results of the same.[90]

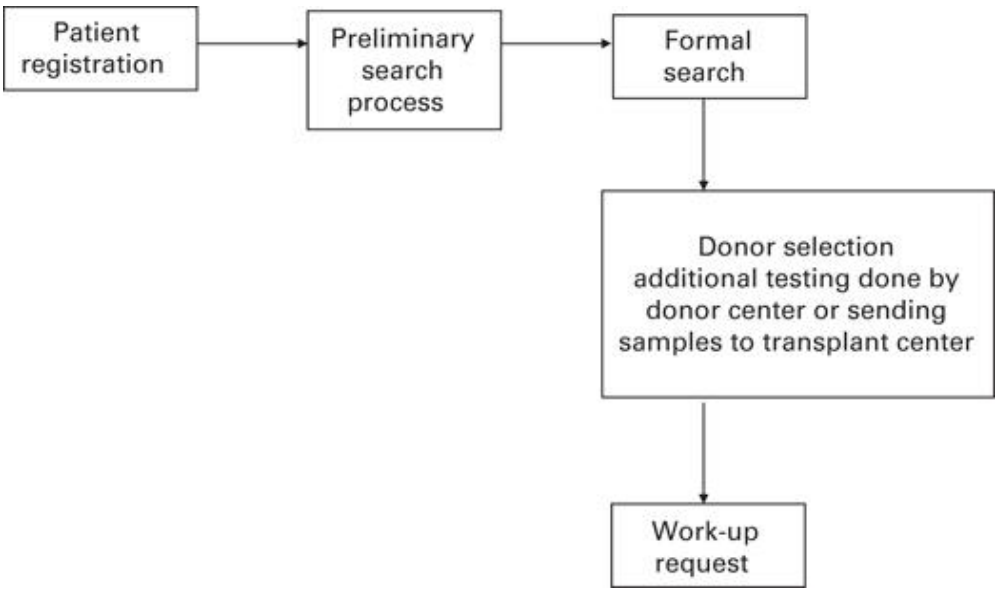


Fig. 6: Flow diagram showing the steps of the search process[70]

PATHWAY OF AN UNRELATED HSC DONOR

There are three stages in the typical pathway of an unrelated donor from the time of registration until donation of HSCs.[31]

1. Recruitment stage

This is the first stage wherein persons willing to donate HSCs to any person anywhere in the world volunteer to get registered in the Registry.

a. Information to the donor

Written information is given to the donor regarding principles, procedures, restrictions and risks of providing blood and other samples and haematopoietic stem cells (either via marrow or peripheral blood donation). It is informed that donation will not take place immediately and further blood

samples may be requested at any time in future. Also, during search requests, medical information like HLA type, infectious disease marker (IDM) test results, blood group, rhesus type, relevant medical history will be provided to transplant centres along with a unique donor number but personal data will be kept strictly confidential. It is informed that the donor has the right to withdraw from the Registry at any stage. The Registry should be notified of changes including commitment to remain on the Registry, contact information and medical status like pregnancy or other conditions that may preclude donation temporarily or permanently.[81]

b. Medical evaluation of donor

The goal of assessment at this stage is to exclude those with medical conditions or lifestyles that would permanently preclude donation. The minimum donor information required at this stage includes height, weight, past or current medical problems, history of allergies, malignancy , autoimmune diseases, high-risk sexual behavior, infections [Human Immunodeficiency Virus, Hepatitis B , Hepatitis C, Human T-lymphotropic Virus, Syphilis , Creutzfeldt-Jakob disease , Chagas disease, tuberculosis, malaria], inherited conditions (sickle cell disease, thalassemia, bleeding disorder) current medications, non-prescription parenteral drug use.[31]

c. HLA typing

It is performed on buccal swabs or blood samples [92,93] and consists of atleast low-resolution typing of HLA-A,-B,-DR loci.[94]

All donor-related information like contact details, age, gender, medical status etc., are uploaded into the software system of the Registry along with the unique donor number assigned to the eligible donor.[67]

2. Confirmatory/Verification Typing (CT/VT) Stage

When a potential donor/recipient match is identified following a search request, the donor is contacted to obtain a sample for confirmatory HLA typing and infectious disease marker (IDM) testing.[31] The donor is reserved for a given patient after donation of tissue samples and is excluded from other patient searches.[92]

a. Information to the donor

Information is given by a trained and qualified representative of the donor centre. Donors are reminded of the procedures, restrictions and risks associated with stem cell donation as a considerable duration may have elapsed from the time of recruitment and also because of the likelihood of progression to donation.[31] It is informed that blood samples will be obtained for histocompatibility testing, testing for infectious disease markers and other relevant analyses. The current probability of being selected for a particular

patient is informed. Travel to another country is not necessary in the event of donation to a recipient from a foreign country. The possibility of further donation requests following initial donation is discussed briefly. Sufficient time is provided to the potential donor to clarify queries.[81]

b. Medical evaluation of donor

Before obtaining samples for IDM testing and confirmatory HLA typing, further medical information like history of acute or chronic back pain, systemic hypertension, cardiac disease, asthma, epilepsy, pregnancy, blood transfusion, alcohol consumption etc., is elicited from the donor and any condition that suggests an increased risk to the recipient is reported to the transplant centre in order to determine suitability of the donor.[31]

c. HLA typing

High-resolution typing of HLA loci is performed which is required for matching with the patient.[61] ABO and Rh type is also tested, if not done previously.[67]

3. Work-Up Stage

At this stage, a volunteer has been identified as a match for a patient and is medically evaluated for fitness to donate hematopoietic stem cells after giving consent for the same.[65]

a. Information to the donor

In a face-to-face interview by a trained and qualified medical doctor, it is informed that the volunteer has been considered a match for a particular patient and is requested to donate. The volunteer's right to decline (even while the patient is being conditioned[92]) and its consequences are informed. A comprehensive overview of the entire process is given including the purpose of medical assessment, donation methods with their respective advantages and disadvantages, the possible need for autologous or allogeneic blood units and associated risks, post-donation recovery. The final choice of route of donation is with the donor. The probability of successful treatment of the patient and postponement or cancellation due to changes in the medical condition of the patient is discussed. Willingness to make further donations for the same patient is enquired. Other issues like insurance coverage by the registry, monitoring of the donor post-donation are discussed.[81]

b. Purpose of Medical Evaluation

Evaluation of the donor at this stage is an opportunity for thorough assessment to identify any medical condition that might have been missed at an earlier stage. A travel history is obtained to prompt appropriate testing. An in-depth sexual history is obtained to identify the possibility of an increased risk of transmission of blood-borne infections.[31]

Table 3: Investigations at workup stage[31]

Examination	General (including height and weight); cardiovascular (including blood pressure); respiratory; gastrointestinal; neurological
Haematology	Full blood count; coagulation screen (including Prothrombin Time, Activated Partial Thromboplastin Time and fibrinogen); Erythrocyte Sedimentation rate; peripheral smear; haemoglobin electrophoresis or high-pressure liquid chromatography ,if indicated
Biochemistry	Urea and electrolytes; liver function tests; Lactate dehydrogenase ; ferritin; random glucose; β-HCG (for females of child-bearing age)
Other investigations	Chest X-ray; electrocardiogram

Table 4: Minimum recommended donor infectious disease marker testing[31]

Stage	***Infectious disease***	***Recommended validated assay***
Recruitment	Nil	Nil
CT/VT stage	HIV	HIV-1,2 antibody
	Hepatitis B	Hepatitis B surface antigen
	Hepatitis C	Hepatitis C antibody
Work-up	HIV	HIV-1,2 antibody, p24 antigen, HIV RNA
	Hepatitis B	Hepatitis B surface antigen and antibody Hepatitis B core antibody, hepatitis B DNA
	Hepatitis C	Hepatitis C antibody, hepatitis C RNA
	HTLV I+II	HTLV I+II antibody
	Syphilis	Validated serological testing algorithm

Part or whole of the evaluation may need to be repeated when there is a delay in transplantation.

Table 5: Schedule of testing in the event of delay in collection of HSCs[31]

Time from work-up medical assessment to collection date	Repeat assessments required
⩽30 days	None
>30 days, ⩽90 days	Infectious disease markers only
>90 days, ⩽12 months	Donor history and examination, all laboratory tests excluding hemoglobinopathy screening, Infectious disease markers
>12 months	Donor history and examination, all laboratory tests excluding hemoglobinopathy screening, Infectious disease markers Chest X-ray and ECG

Psychological assessment of the donor

The psychological condition of the donor should be assessed to determine the motivations for considering the HSC donation and to rule out any coercion on the donor.[50] After HSC donation, the donor is reserved for that particular patient. During this period, the donor may donate whole blood, plasma, and platelets for the public domain, according to national blood-transfusion standards.[92]

DONOR FOLLOW-UP AFTER HSC DONATION

Donor follow-up is conducted within the first week of donation, at 1-month post donation (or until resolution of all symptoms is reported), at 1 year and thereafter annually or bi-annually for up to 10 years (lifelong in some countries).[95]

SUBSEQUENT DONATION AFTER INITIAL HSC DONATION

About 5–10% of the donors are requested for a subsequent donation of HSCs or Therapeutic cells (TCs) [T lymphocytes, whole blood, platelets etc.,] for immune modulation or to increase donor-derived haematopoiesis. The most common subsequent donation is donor lymphocytes, followed by PBSCs, bone marrow and whole blood.[95] Second donations of HSCs are not associated with an increased risk of donor complications but the yield of CD34+ cells may be lower in some donors. Short intervals (< or =3 months) between donations requires limited evaluation including a full blood count and tests for mandatory infectious disease markers. Longer intervals warrant full medical evaluation. A minimum period of 4 weeks should elapse between the first and second donations of HSCs.[32] Donors can donate HSCs for a maximum of two patients, with rare exceptions. The minimum duration between donations to two patients is 12–24 months except when the first recipient has died. Two or more further HSC donations for the second patient may occur but there are no recommendations as to how many donations of

bone marrow versus PBSC should be allowed. One donation of TCs is routinely accepted. Second donations of TCs to the same recipient depends upon Registry policy and the minimum interval is about 1 to 3 months. TCs are not donated to a patient for whom the donor has not donated HSCs. If the donor who has donated to an unrelated person is later asked to donate for a family member, eligibility of the donor to donate and to remain available on the unrelated registry needs evaluation.[95]

ACCESS TO INTERNATIONAL DONORS OF HSCs

About one-third of unrelated transplantations worldwide utilize HSCs from a donor in another country.[65] Exchange of HSCs is permitted in India.[96] In 2013, 52 of the 76 HSC products were from unrelated donors of other countries i.e., 29 (38%) came from Germany, 17 (22%) from the USA and 6 (8%) from other countries.[22] The concept of unrelated HSC donor search at the international level was initiated by Jon J van Rood at the Europdonor Foundation in Leiden. The global catalogue of HLA phenotype data came to be known as Bone Marrow Donors Worldwide (BMDW).[64] Currently, 75 individual national registries from 53 countries are registered members of BMDW and have pooled their HLA donor data into its multi-national database.[1]

The World Marrow Donor Association (WMDA) is an international non-profit organization founded in 1994 in Netherlands.[64] It promotes the

definition and standardization of ethical, technical, medical, and financial aspects of HSCT involving volunteer donors in one country who give HSCs to unrelated patients in another country.[65] Its mission is to foster collaboration between international registries and to ensure that high-quality products are available for all patients while maintaining donor health and safety.[31,64]

NEED TO INCREASE THE SIZE OF THE REGISTRY

About 28 million people have registered as HSC donors worldwide.[1] However, this represents only about 0.3 % of the world population.[4] HLA genes are highly polymorphic; more than 14,000 HLA alleles have been assigned which accounts for more than 10,000 different HLA proteins.[55] Also, allelic variation is population-specific.[5] This increasing level of complexity has negative consequences for patient/unrelated donor matching.[55] Two people are more likely to match if they belong to the same race.[3] The amount of representation of a particular ethnic or racial group in a registry is very important.[4] Other factors like low intra-population genetic diversity and close genetic relatedness to other donor populations available in the registry also increase match likelihoods.[22] About 1-5% of patients do not have a single potentially matched donor in the BMDW database since majority of the donors represent Western European ancestry.[55] Total Asian population is only 11 % of the total number of registered donors worldwide.[4]

India is a land of ethnic, cultural, geographic and linguistic diversity reflected by the existence of 3824 castes, 25,000 sub-castes and 461 tribes.[97] Novel HLA alleles and unique haplotypes have been detected in the Indian population.[63] The probability of an Indian patient finding an allele match is 16 % in multinational registries and even lesser (only 0.008 %) in the India given its current registry size (~ 1.5 lakh donors in total).[4] Thus, Indian patients are more likely to find a match outside of the country than within.[5] However, relying on foreign registries is time-consuming, costly (~12 lakh rupees for search process alone[14]) and may not be productive at all times. A population-based study modelled Indian registry growth to predict the likelihood of identifying a suitable donor. It was found that the mean proportion of individuals who would have a 10/10 adult donor match within India would be 28·1% with a registry size of 1 lakh. The proportion of matches increased logarithmically with increased registry size. Also, only when it increased to 2.5 lakh did the match rate within India exceed that found by searching a foreign registry combined with the national registry.[5] Thus, there is an obvious need to increase the registry size in India.

JOINING UNRELATED HSC DONOR REGISTRY

A study on motivation behind donating HSCs to an unrelated person identified different motives like a desire to act in accordance with social or religious precepts, expected positive feelings about donating, empathy for the recipient, simple desire to help another person, and exchange motives.[98] Yet,

the first step in unrelated HSC donation is voluntary enrolment of the donor into the registry.

KNOWLEDGE, ATTITUDE AND BEHAVIOUR (KAB)

As per KAB model, knowledge is a prerequisite to the intentional performance of a health-related behaviour.[23] Various studies have reported about awareness and knowledge regarding HSC donation and unrelated HSC donor registry.

Varghese ST et al[99] in their study among 81 engineering students in Kerala found that 18.5% of the students were aware about HSC donation. Further, 69.1% of them had inadequate knowledge, 30.9 % of them had moderately adequate knowledge and none of them had adequate knowledge regarding HSC donation. Laver JH et al[100] in their study among 589 potential eligible HSC donors in South Carolina in 2001 found that 92% were aware of HSCT as a life-saving procedure and 51.7 % of them were aware of their national HSC donor registry. Onitilo AA et al[101] in their study in South Carolina in 2004 among 829 potential eligible HSC donors found that 92.8% of them were aware of HSCT as a life-saving procedure and 42.9% of them were aware of their national HSC donor registry.

The KAB model also states that information leads to accumulation of knowledge which changes attitude, behaviour, or both.[23] Extrapolating the theory of reasoned action and the theory of planned behaviour, the act of

joining a registry must be preceded by the intention to do so which is measured by seeking an estimate of the probability of acting on that specific behavior.[26] Kaya Z et al[102] in their study on 301 college students in Turkey in 2015 reported that before and after lecture, 65% and 76% of them were willing to donate HSCs, respectively. Studts JL et al[86] in their study among 102 medical students in Kentucky reported that 49% of the participants agreed to register at an unrelated HSC donor registry after providing necessary information with regard to HSC donation.

Not all the individuals who were willing to donate HSCs to unrelated individuals, were willing to join the registry. Kwok J et al[88] in their study among 3479 potential HSC donors in Hong Kong found that among those who were willing to donate HSCs to unrelated individuals, 51.5% of them were willing to be contacted to sign up for their national registry and Onitilo AA et al[101] in their study found that only 44.7% of those who were willing to donate HSCs, were willing to be contacted to sign up for the national registry.

Individuals showed preference in their willingness to donate HSCs. Sanavi S et al[103] in their study among 416 Iranian high-school students reported that among those who were willing to donate HSCs, 16 % of them wanted to donate only to their family members and Kwok J et al[88] in their study reported that among those who were willing to donate HSCs, 25.5% of them expressed willingness to donate only to their family members.

Reasons for unwillingness of the individuals to donate HSCs have been reported in various studies. Kwok J et al[88] in their study reported that fear of pain, fear of after-effects, health concern and inadequate knowledge were the major reasons for unwillingness to donate HSCs. Onitilo AA et al[101] in their study reported that fear of pain, inconvenience, cost of being a donor, lack of opportunity were the major reasons for not wanting to become a donor of HSCs.

Individuals' willingness to donate HSCs have been found to be influenced by others' opinion. McCullough J et al[104] in their study among 150 whole blood or apheresis donors in Minnesota in 1986 reported that 54% of the donors had discussed with another person, most commonly the spouse, before enrolling into unrelated HSC donor registry.

Studies have reported about individuals who had already exhibited behaviour by joining a registry. The studies done among potential eligible HSC donors by Kwok J et al[88] and Bart T et al[105] revealed that 13.6 % and 22.8%, respectively, were already registered at an unrelated HSC donor registry.

Studies have also investigated various sociodemographic variables for their influence in individual's willingness to donate HSCs.

Age

Volken T et al[106] in their study among 900 potential eligible HSC donors in Switzerland and Beatty PG et al[19] in their study in 1989 in USA found that age was not significantly associated with willingness to become a donor of HSCs. However, in the study by Kwok J et al,[88] it was reported that respondents were more willing to donate to unrelated individuals if they were in the age groups of 18-46 years. Onitilo AA et al[101] also reported in their study that younger individuals were more willing to donate HSCs.

Gender

Volken T[106], Kwok J et al[88], Onitilo AA et al[101] and Beatty PG et al[19] in their the studies reported that gender was not significantly associated with willingness to donate HSCs. However, less male students showed intention to donate HSCs than female students in the study by Kim M et al [107] in their study in Korea among 174 nursing students. Also, Studts JL et al[86] in their study also reported that females were more likely to agree to register at an unrelated HSC donor registry. However, Briggs et al[108] in their study among 489 apheresis donors reported that women were less likely to express willingness to donate HSCs than men.

Marital status

Briggs et al [108] in their study showed that married people were less likely to express willingness to donate HSCs than unmarried people. However, Studts JL et al[86] had reported in their study that married participants were more likely to agree to register at an unrelated HSC donor registry.

Education

Volken T et al[106], Sanavi S et al[103] and Briggs et al[108] in their studies reported that education was not significantly associated with willingness to donate HSCs. However, studies by Onitilo AA et al[101], Kwok J et al[88] and Laver JH et al[100] reported that individuals with higher levels of education were more willing to donate HSCs.

Whole blood donation

Beatty PG et al[19] in their study reported that there was a strong correlation between previous blood donation history and probability of becoming a donor of HSCs. Donors who had given 5 or fewer units in the past 5 years' duration had a 5 percent probability of joining, donors who had given between 16 and 20 units had a 38 percent probability, and donors with a history of more than 20 units had a 60 percent probability of joining the registry. In contrast, results of the study by Briggs et al[108] showed that the number of prior whole blood donations was negatively related to willingness to become a HSC donor.

Apheresis donation

Briggs et al[108] in their study reported that prior apheresis donation was negatively related to willingness to become a HSC donor.

Level of knowledge

Results of the study by Kwok J et al[88] showed that level of knowledge regarding HSC donation was significantly associated with willingness to donate HSCs and higher knowledge scores were related to willingness to donate HSCs.

Having a known person who needs HSCs as treatment

Galanis PA et al[109] in their study in Greeks among 565 potential eligible HSC donors reported that persons with a relative or a friend in need of HSCT were more likely to express willingness to donate HSCs. Also, results of the study by Studts JL et al[86] showed that participants who had a family history of cancer were more likely to agree to register as a donor of HSCs.

Thus, KAB study among voluntary blood donors regarding HSC donation and unrelated HSC donor registry would help in framing dedicated initiatives to facilitate donor pool expansion in unrelated HSC donor registries in the country.

MATERIALS & METHODS

MATERIALS & METHODS

Study design

This study is a qualitative study conducted at the Department of Transfusion Medicine, The Tamil Nadu Dr. M.G.R Medical University, Guindy, Chennai. The University Ethical Committee of The Tamil Nadu Dr. M.G.R Medical University approved this study.

Study population

Persons who fulfilled the eligibility criteria for blood donation as per the guidelines of Directorate General of Health Services (DGHS)[111] and who donated blood (at camps and through "walk-in") to the Blood Bank of the Department of Transfusion medicine, The Tamil Nadu Dr. M.G.R Medical University, Guindy, Chennai during the study period from July 2015 to June 2016.

Inclusion criteria

Voluntary blood donors who were willing to participate in the study were randomly included.

Exclusion criteria

Persons who did not fulfil the eligibility criteria for blood donation as per the guidelines of DGHS and eligible voluntary blood donors who were not willing to participate in the study were excluded.

Sample size

Sample size was calculated using nMaster Software as 384 with expected proportion 50%, precision 5% and 95% confidence level, using the formula:

$$n = \frac{(1.96)^2 \times p \times q}{d^2}$$

Refusals and drop outs : 10 % (i.e., 38)

Minimum required sample size : 422

Statistical analysis

Data was entered into EXCEL and statistically analysed using SPSS software. Categorical data was expressed in frequency and percentage. Chi square test was used to assess the association between donor-related factors and willingness to donate HSCs to unrelated individuals.

Materials

1. Donor-related data were collected including age, gender, marital status, level of education as per Kuppuswamy scale,[112] past history of blood donation, number of units of blood donated, past history of apheresis donation.

2. Pre- and post- interventional study questionnaire was used to collect information about knowledge, attitude and behaviour among voluntary blood donors regarding hematopoietic stem cell (HSC) donation and unrelated HSC donor registry.

3. Assessment of knowledge, attitude and behaviour (KAB)

A. Knowledge:

Knowledge was assessed based on the response to the following 6 questions.

a. Have you heard about marrow stem cell donation?

b. Do you know for what purpose marrow stem cells are donated?

c. Is there any person known to you who needs or has needed marrow stem cells as treatment?

d. Do you know about the risks involved in marrow stem cell donation procedure?

e. Do you know what important test is done before marrow stem cells are donated?

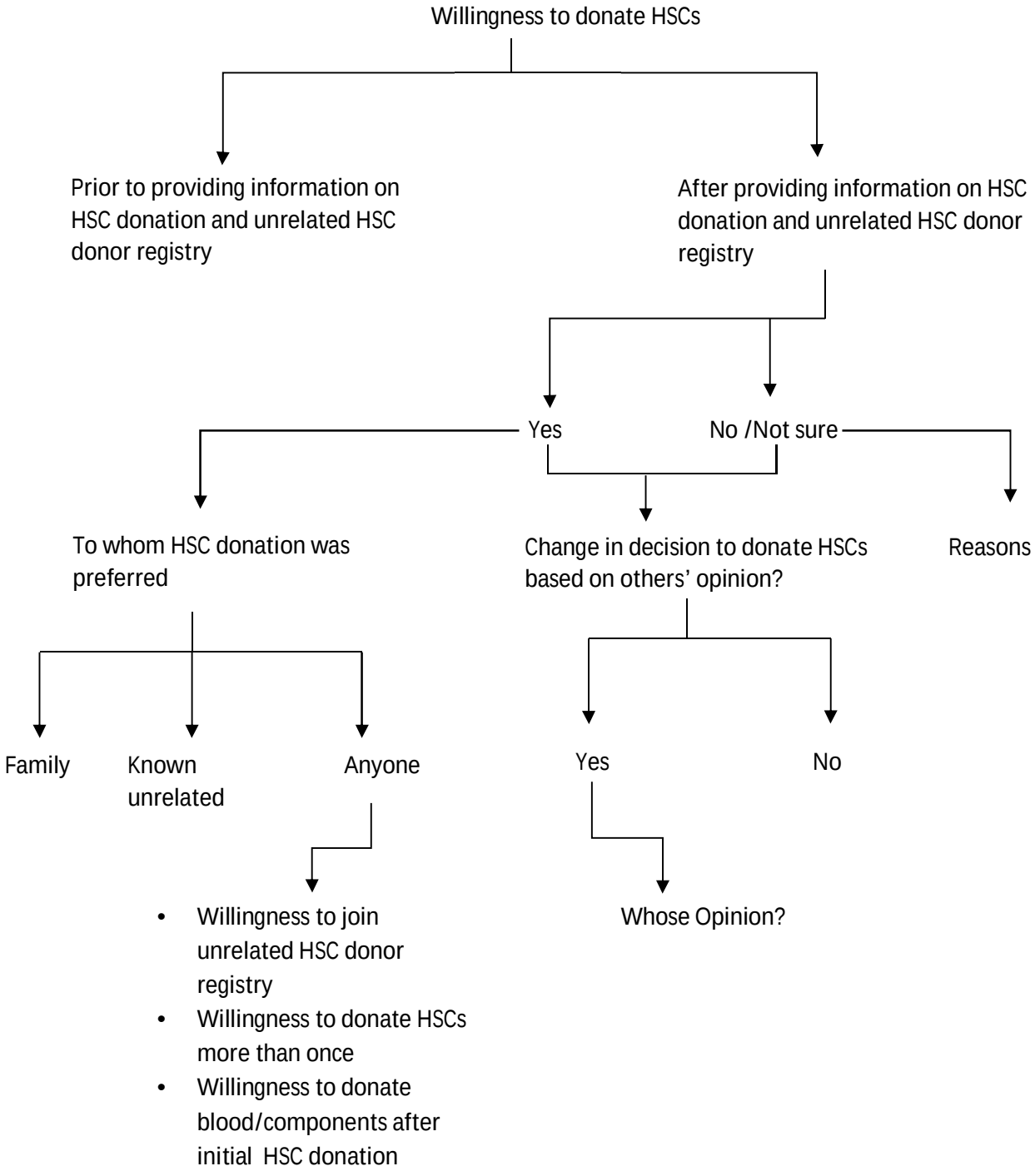
f. Have you heard about registry for unrelated adult marrow stem cell donors?

Each correct response was given one point. Score obtained by each donor was calculated out of a total of 6 points. Level of knowledge was categorised as given in the following table:

Score Obtained (Maximum – 6 points)	**Level of Knowledge**
> 3	"Desirable"
≤ 3	"Below desirable"

B. Attitude

Attitude was assessed based on the response to following questions regarding willingness to donate HSCs.


Willingness to donate HSCs
Prior to providing information on HSC donation and unrelated HSC donor registry
After providing information on HSC donation and unrelated HSC donor registry
Yes
No /Not sure
To whom HSC donation was preferred
Change in decision to donate HSCs based on others' opinion?
Reasons
Family
Known unrelated
Anyone
Yes
No
Whose Opinion?
• Willingness to join unrelated HSC donor registry
• Willingness to donate HSCs more than once
• Willingness to donate blood/components after initial HSC donation

C. Behaviour:

Behaviour was assessed by registration status of voluntary blood donors at an unrelated HSC donor registry.

Methodology

1. Persons who volunteered to donate blood at camps and also through "walk-in" were made to fill Donor History Questionnaire for blood donation and then undergo physical examination by the Medical officer.

2. Once declared fit to donate blood, individuals were approached randomly for their willingness to participate in the study after explaining about the study and their informed consent obtained.

3. Participants were individually interviewed and pre-interventional part of the questionnaire was completed.

4. Then, a handout providing information as per guidelines of the World Marrow Donor Association[81] was given to the participants, covering the following aspects:

    a. About HSCs [113]
    b. HSC transplantation (HSCT) [113]
    c. Role of Human leukocyte antigen (HLA) in HSCT [2,113]

d. HSC donation [81,50,113,114]

e. Unrelated HSC donor registry [11,75,81]

f. Need for more unrelated HSC donors in India [5,8,14,16,55]

5. The interview was continued and the post-interventional part of the questionnaire was completed.

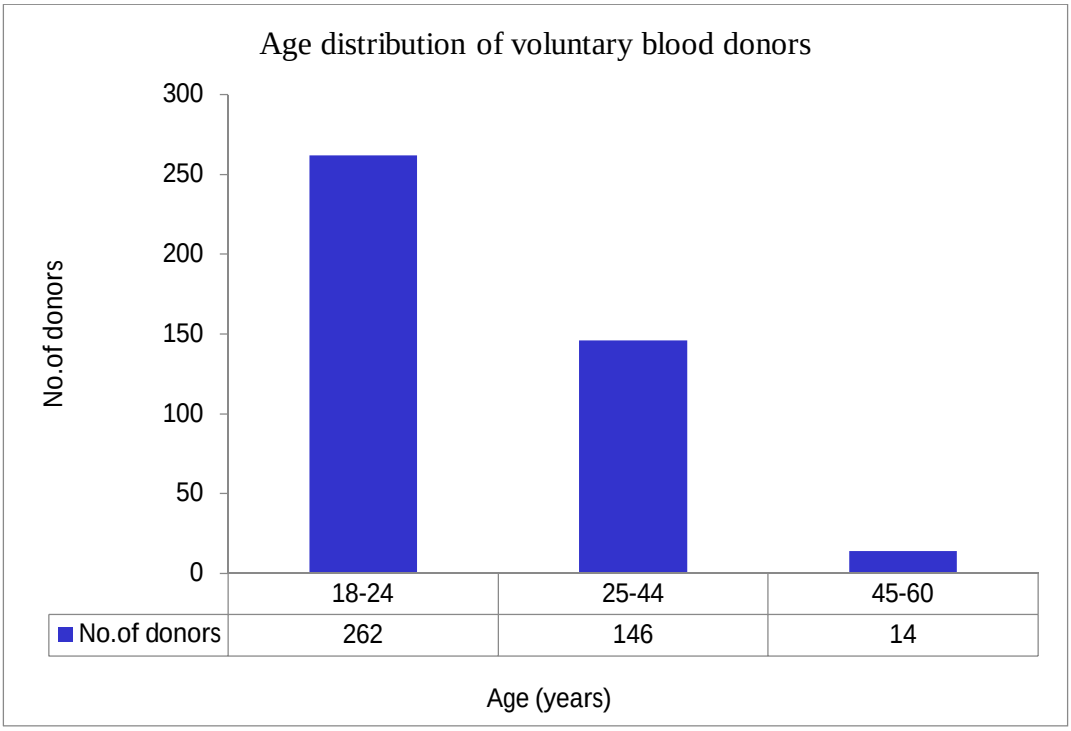
6. The participants were thanked and then directed to the phlebotomist.

RESULTS

RESULTS

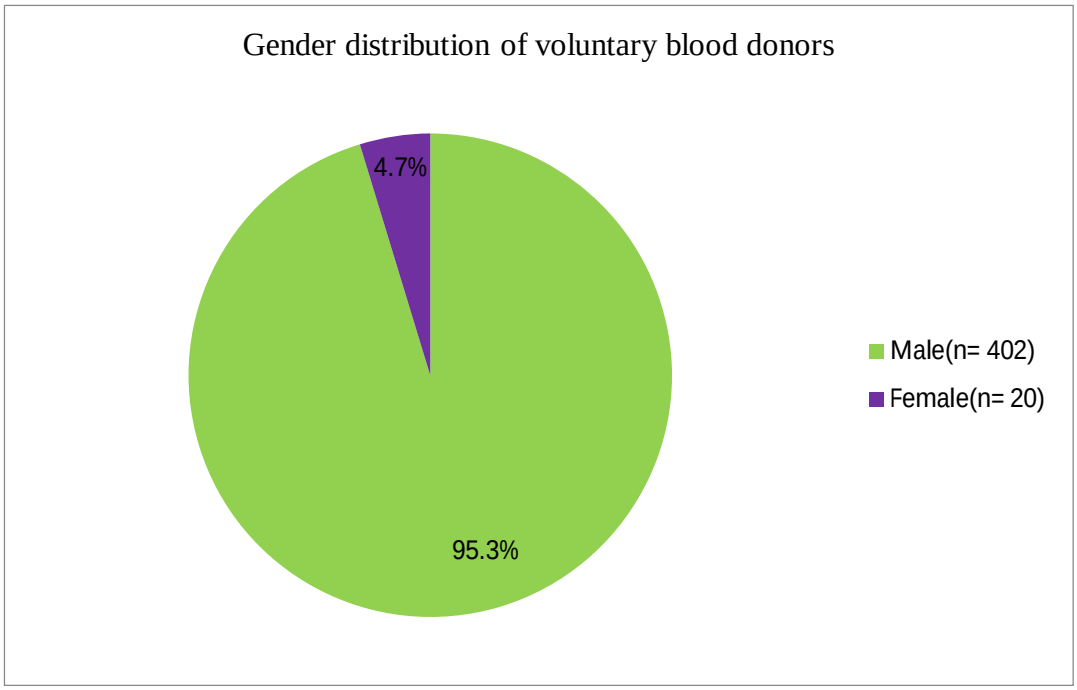
I. STATISTICS ON DONOR-RELATED DATA

1. Age distribution of voluntary blood donors

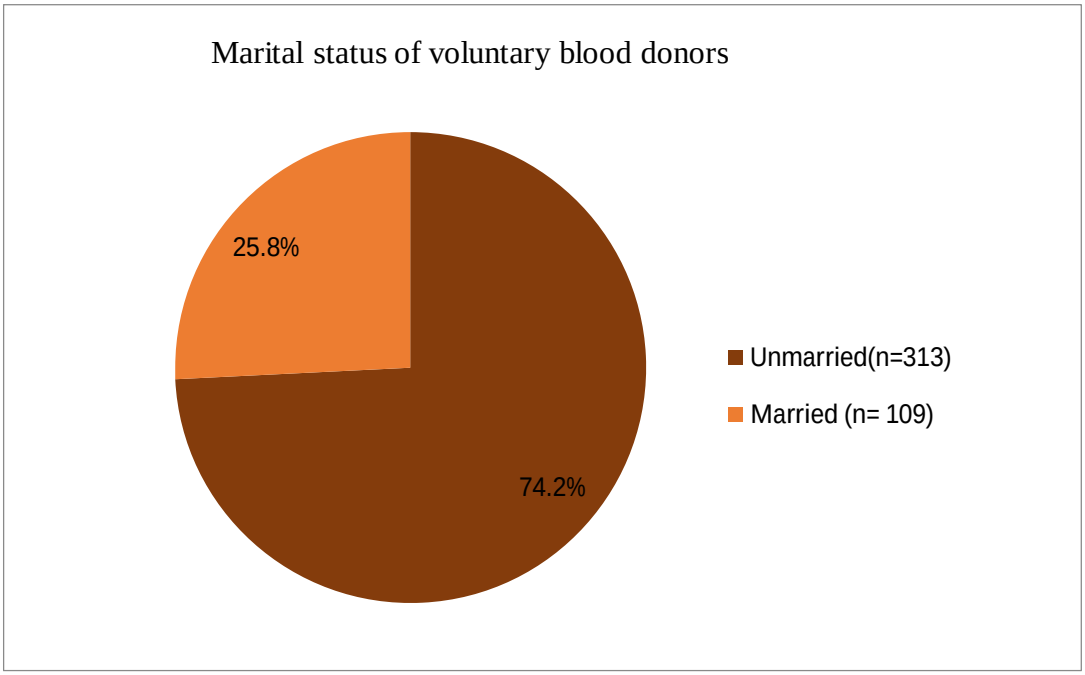


Variable	Minimum	Maximum	Mean	Std. Deviation
Age (years)	18	57	25.22	7.76

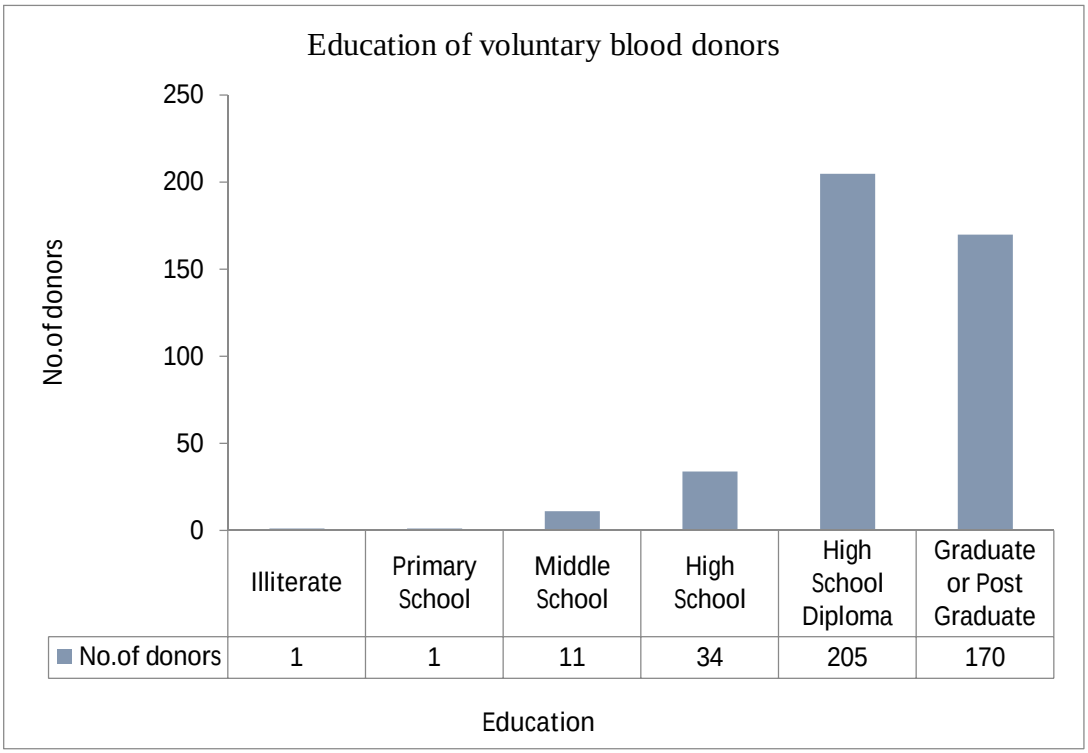
2. Gender distribution of voluntary blood donors



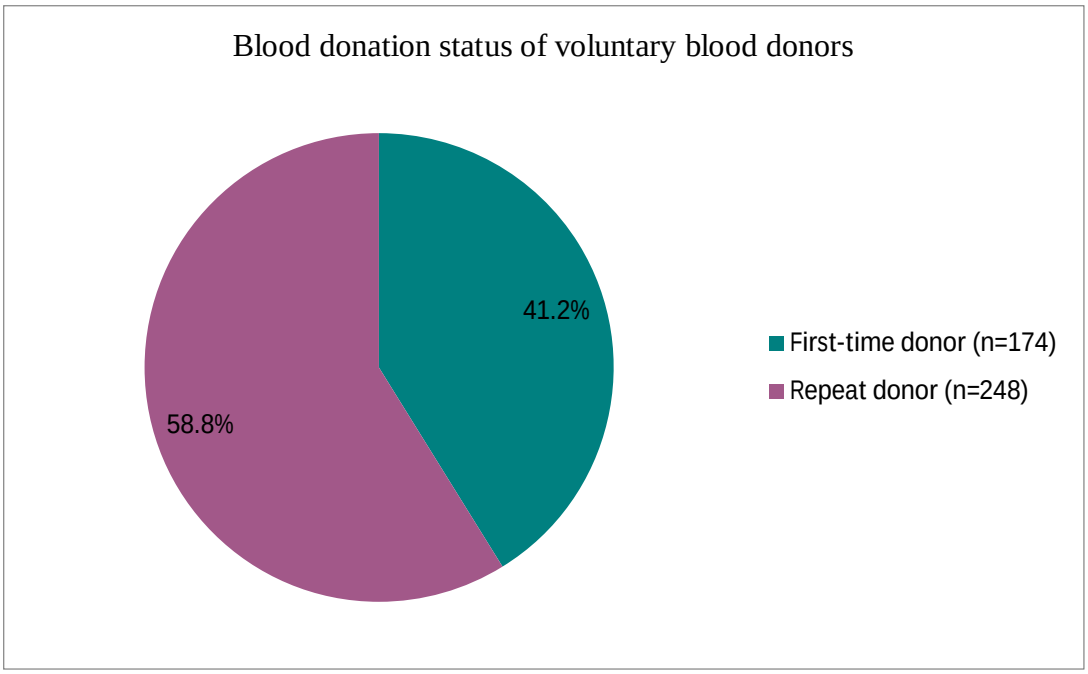
3. Marital status of voluntary blood donors



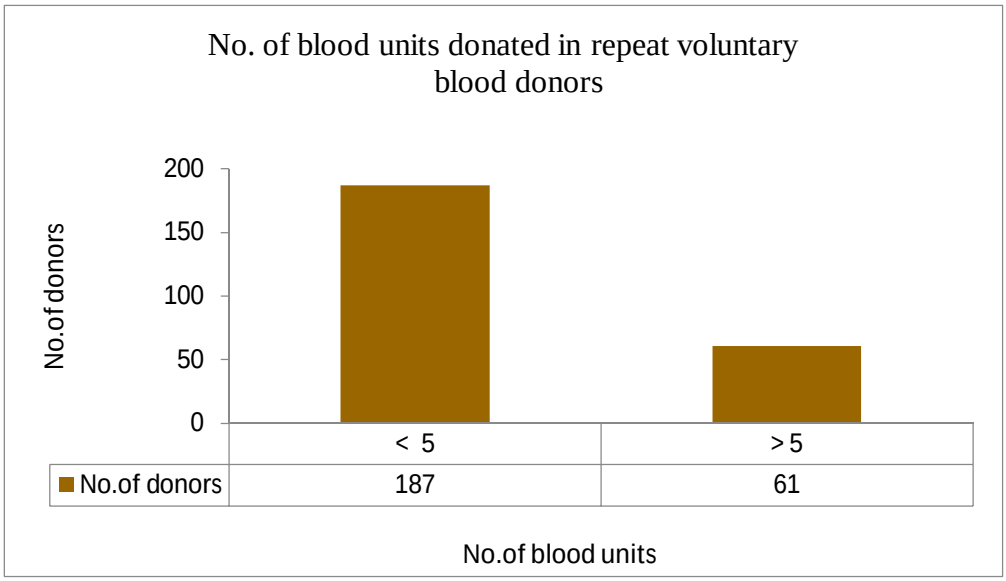
4. Education of voluntary blood donors



5. Blood donation status of voluntary blood donors

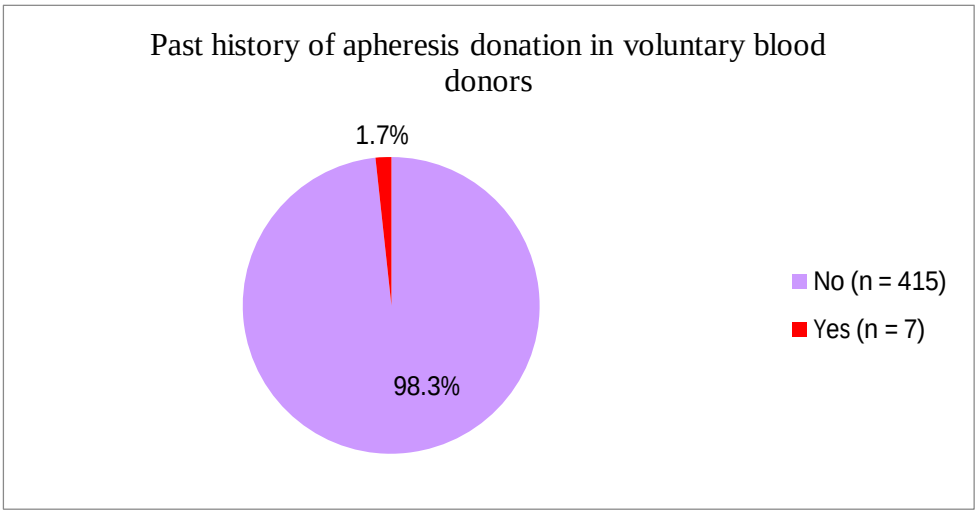


6. No. of blood units donated in repeat voluntary blood donors



Variable	Minimum	Maximum	Mean	Std. Deviation
No. of blood units donated previously in repeat donors (n=248)	1	130	4.86	9.536

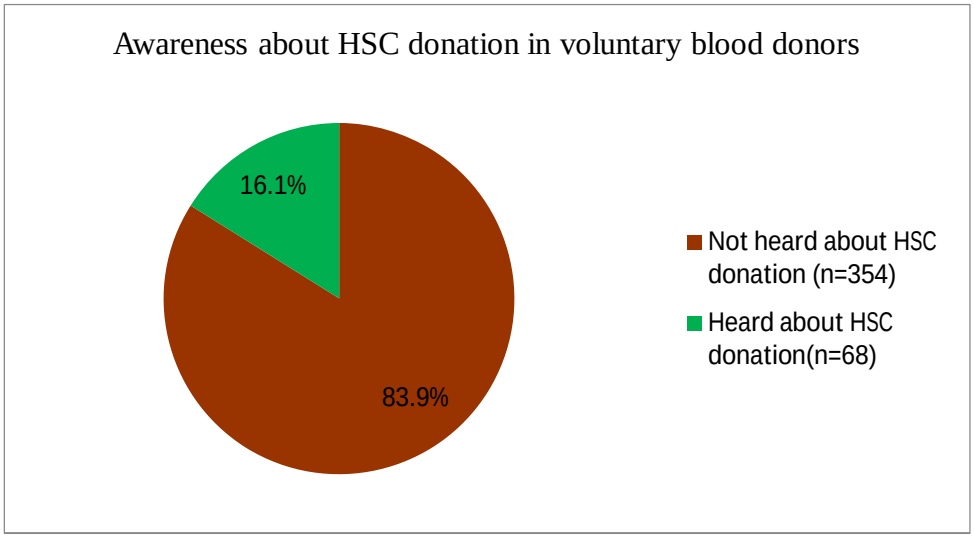
6. Past history of apheresis donation in voluntary blood donors



In this study population (N= 422), 7 (1.7%) donors had undergone plateletpheresis.

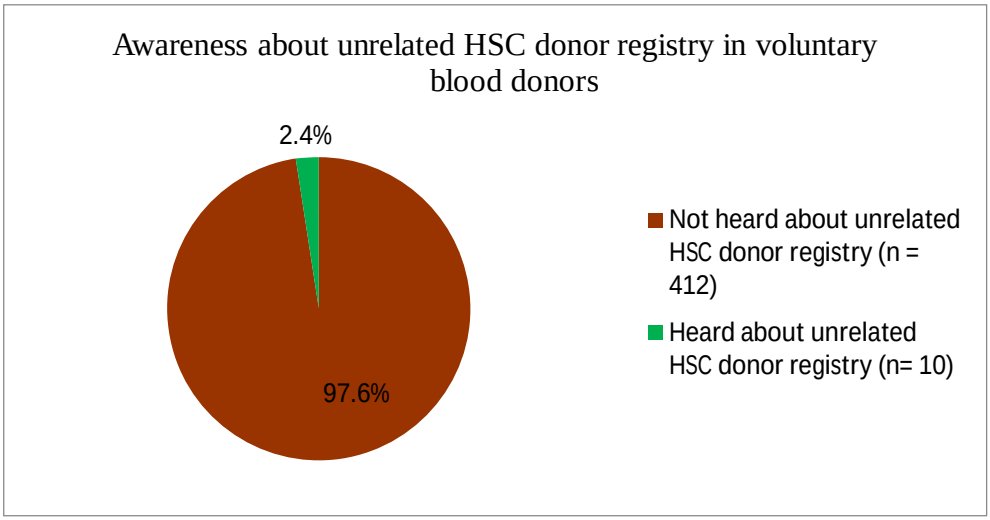
II. STATISTICS ON KNOWLEDGE

1. Awareness about HSC donation in voluntary blood donors



In this study population (N = 422), 68 (16.1%) donors were aware of HSC donation.

2. Awareness about unrelated HSC donor registry in voluntary blood donors

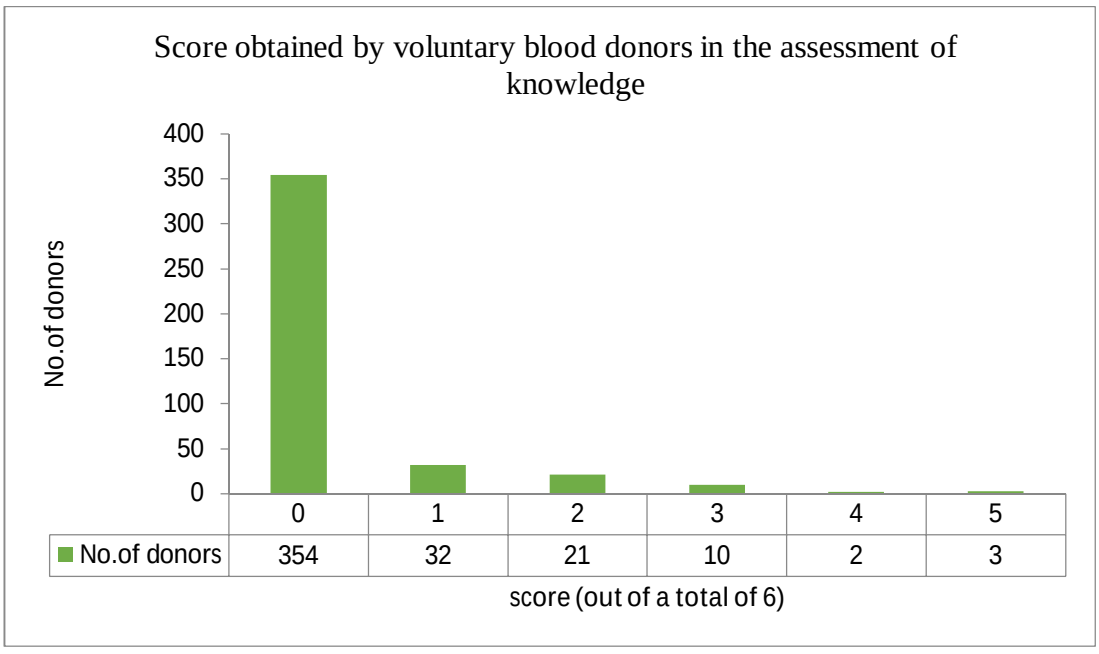


In this study population (N = 422), 10 (2.4%) donors were aware of unrelated HSC donor registry.

3. Assessment of level of knowledge regarding HSC donation and unrelated HSC donor registry among voluntary blood donors

Variables		No. of donors	Percentage
Heard about HSC donation	Yes	68 (out of 422)	16.1%
	No	354 (out of 422)	83.9%
Knows about purpose of HSC donation	Yes	34 (out of 68)	50%
	No	34 (out of 68)	50%
Any person known to the donor needing HSCs as treatment	Yes	7 (out of 34)	20.6%
	No	27 (out of 34)	79.4%
Knows about risks involved in HSC donation	Yes	3 (out of 68)	4.4%
	No	65 (out of 68)	95.6%
Knows about important test to undergo as a HSC donor	Yes	5 (out of 68)	7.4%
	No	63 (out of 68)	92.6%
Heard about unrelated HSC donor registry	Yes	10 (out of 422)	2.4%
	No	412 (out of 422)	97.6%

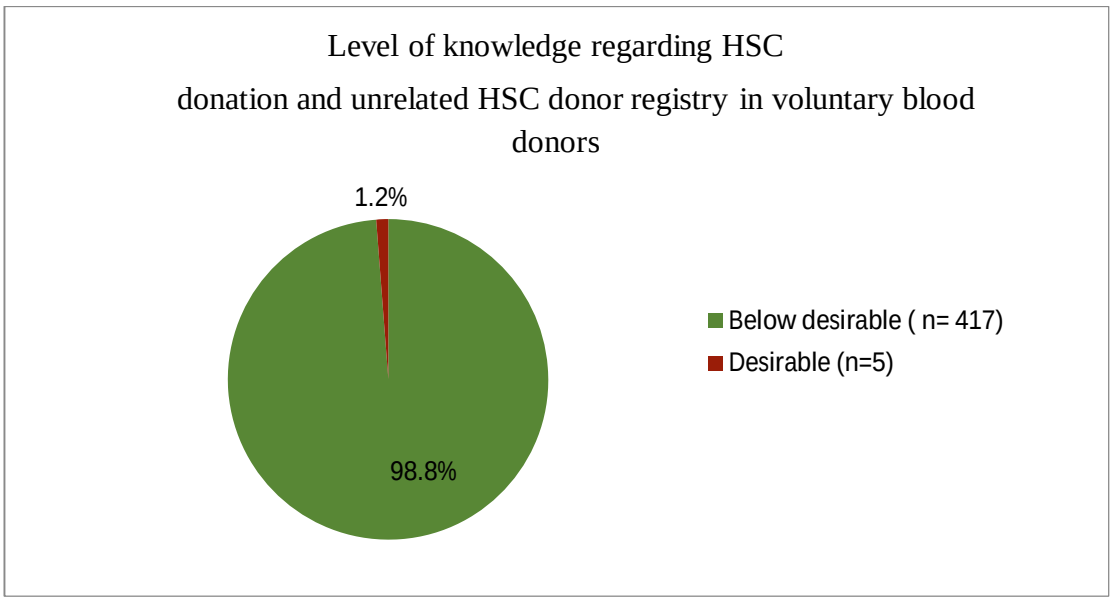
Score obtained by voluntary blood donors in the assessment of knowledge



Variable	Minimum	Maximum	Mean	Std. Deviation
Score obtained in the assessment of knowledge	0	5	0.30	0.808

In this study population (N=422), out of a total score of “6”, minimum score noted was “0” which was obtained by 354 (83.9%) donors. Maximum score noted was “5” which was obtained by only 3 (0.7%) donors.

Level of knowledge in voluntary blood donors

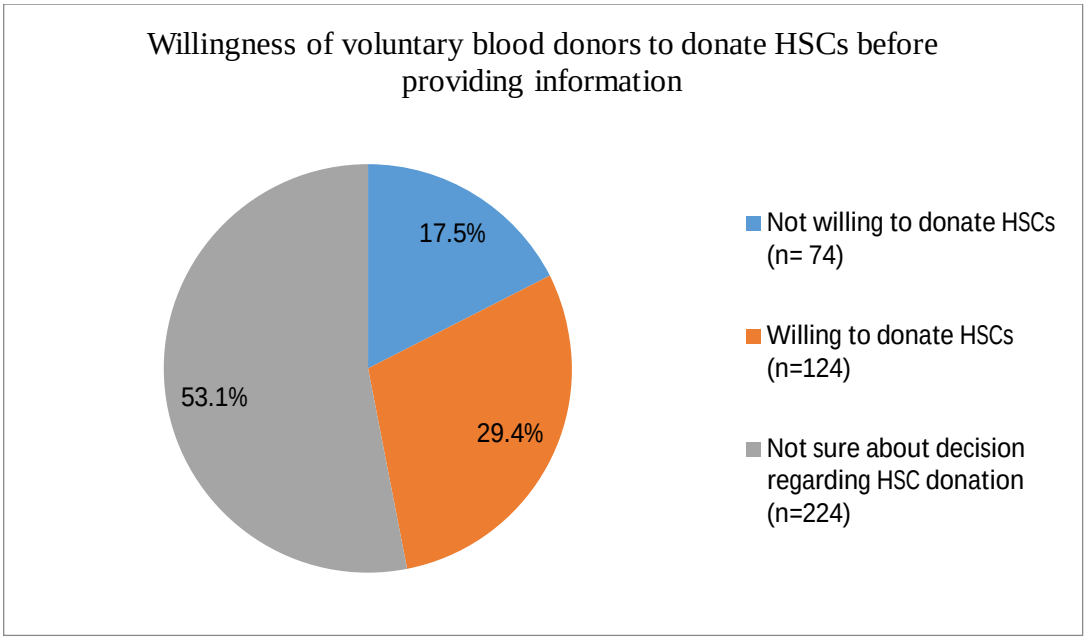


In this study population (N=422), 417 (98.8%) of the donors had “below desirable knowledge” and 5 (1.2%) of the donors had “desirable knowledge”.

III. STATISTICS ON ATTITUDE

A. Before providing information

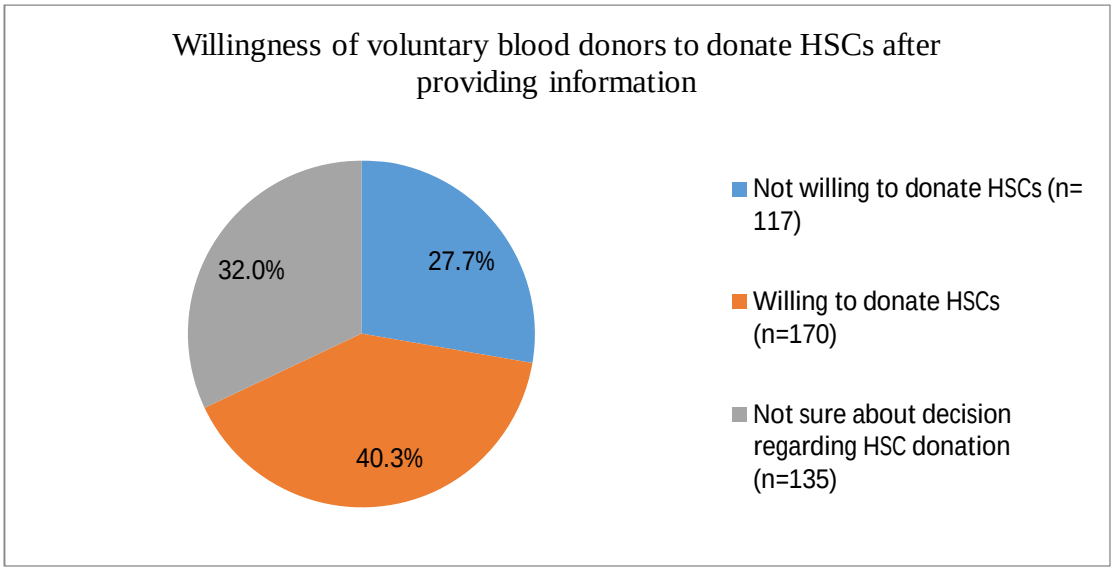
1. Willingness of voluntary blood donors to donate HSCs before providing information



In this study population (N = 422), 224 (53.1%) of the donors were not sure about their decision regarding HSC donation, prior to receiving information. 124 (29.4%) of the donors were willing and 74 (17.5%) of the donors were not willing to donate HSCs, prior to receiving information.

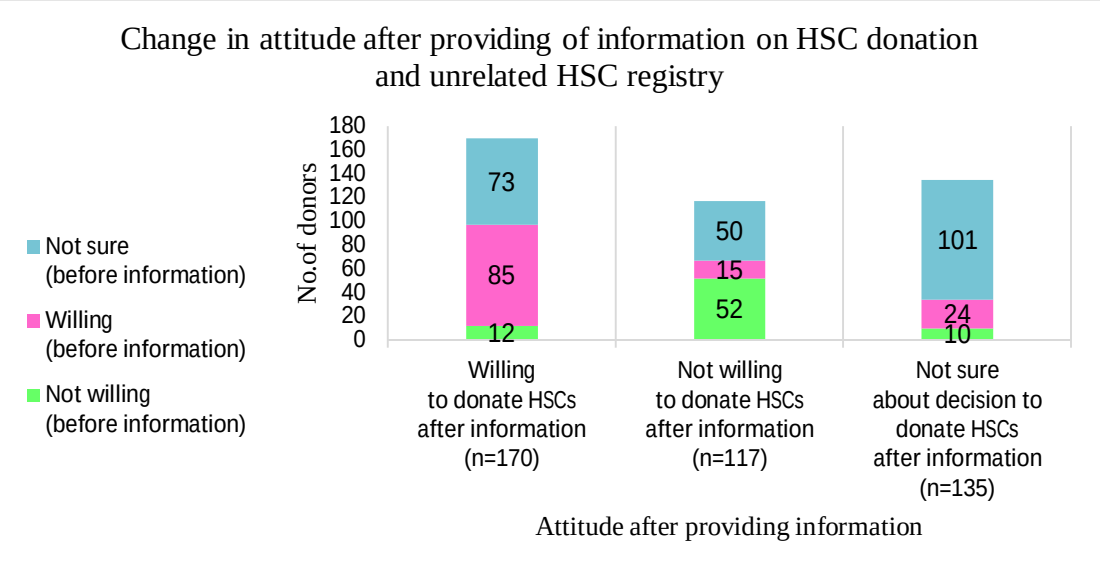
B. After providing information

1. Willingness of voluntary blood donors to donate HSCs



In this study population (N = 422), 170 (40.3%) of the donors were willing to donate HSCs after receiving information. 135 (32%) of the donors were not sure about their decision regarding HSC donation and 117 (27.7%) of the donors were not willing to donate HSCs after receiving information.

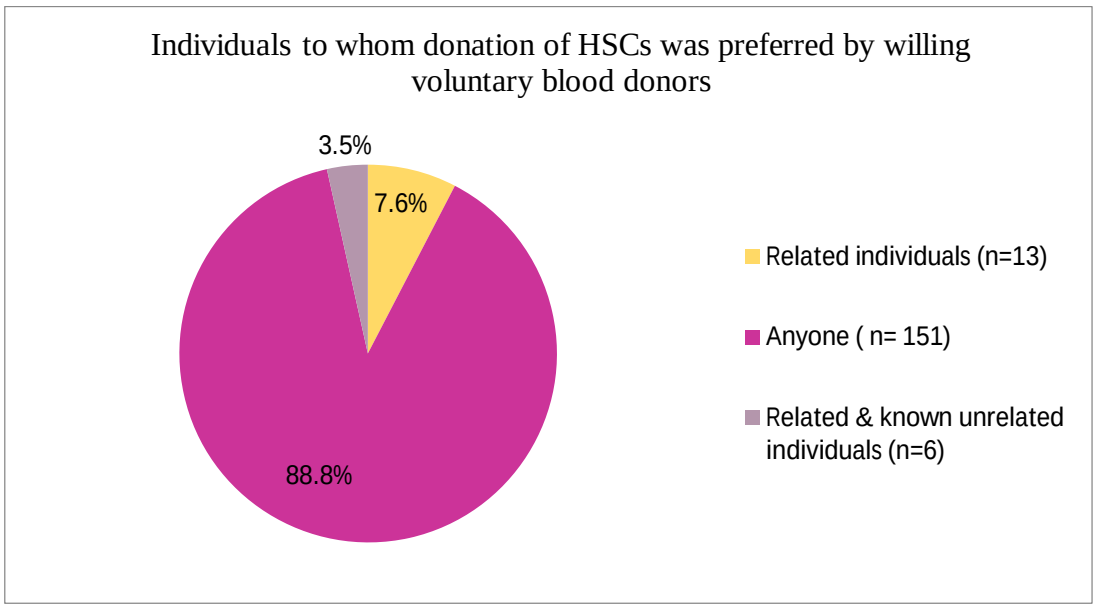
2. Change in attitude after providing information on HSC donation and unrelated HSC registry



Attitude prior to providing information	No. of donors who retained the same attitude after information	No. of donors who changed their attitude after information
Willing to donate HSCs (n=124)	85 (68.5%)	39 (31.5%)
Not willing to donate HSCs (n=74)	52 (70.3%)	22 (29.7%)
Not sure about decision to donate (n=224)	101 (45.1%)	123 (54.9%)

In this study population (N = 422), 39 (31.5%), 22 (29.7%), and 123 (54.9%) of the donors who were initially willing (n=124), unwilling (n=74) and not sure about their decision to donate HSCs (n=224), respectively, had changed their attitude after providing information.

3. Individuals to whom HSC donation was preferred by willing voluntary blood donors.

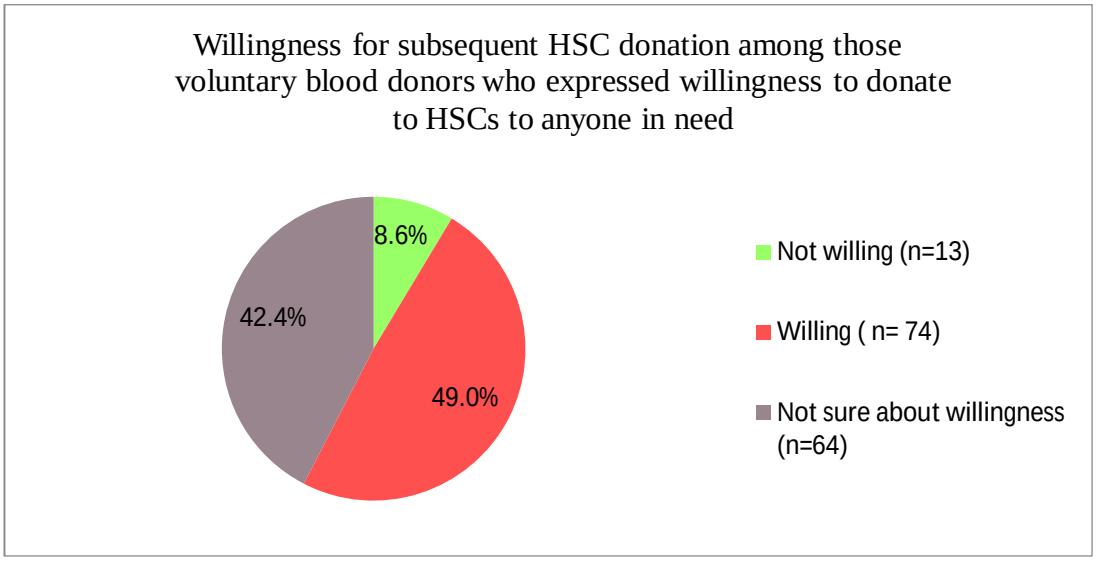


In this study population (N = 422), among the donors who were willing to donate HSCs (n=170), 151 (88.8%) of them were willing to donate to anyone in need of HSCs as treatment. 13 (7.6%) of them were willing to donate only to related individuals and 6 (3.5%) of them were willing to donate to related and known unrelated individuals.

4. Willingness to join unrelated HSC donor registry among those voluntary blood donors who expressed willingness to donate HSCs to anyone in need

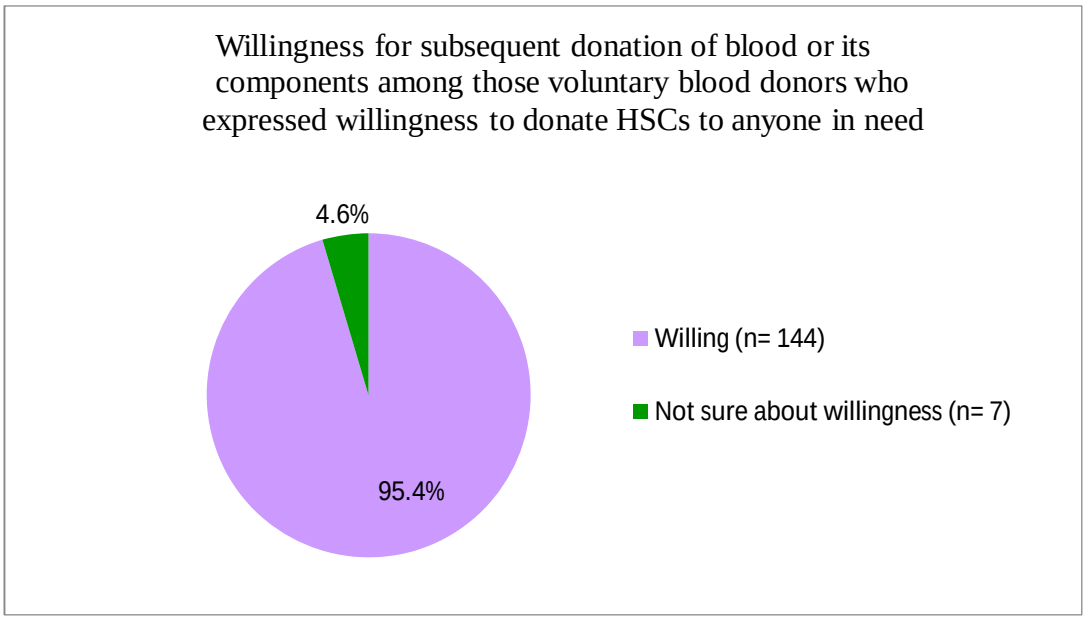
In this study population (N = 422), all the donors who expressed willingness to donate HSCs to anyone in need (n=151), expressed willingness to join unrelated HSC donor registry.

5. Willingness for subsequent HSC donation among those voluntary blood donors who expressed willingness to donate to HSCs to anyone in need



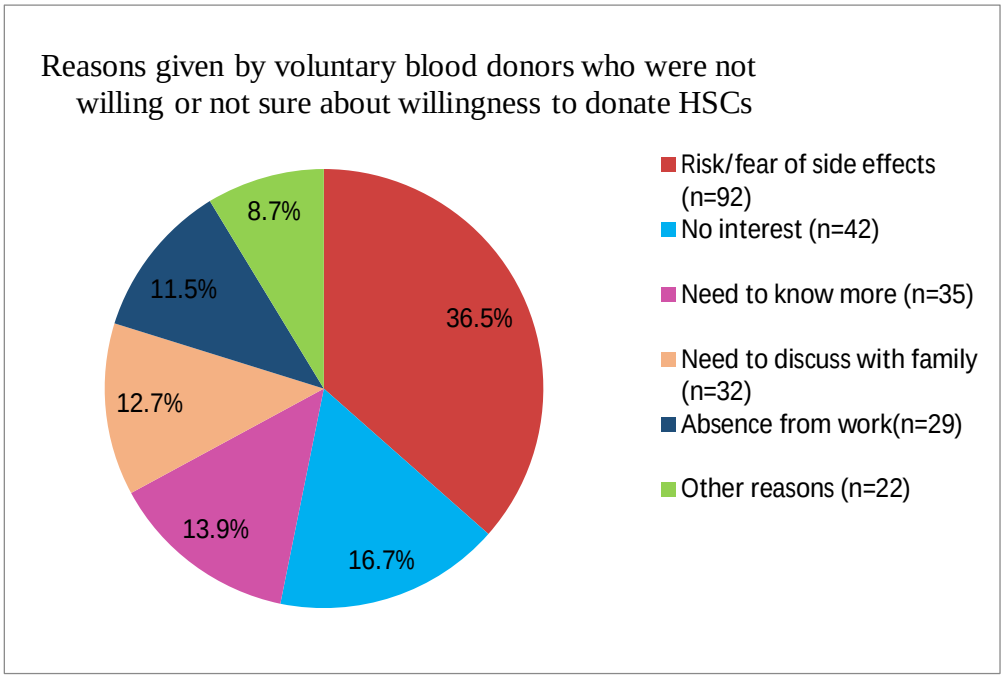
In this study population (N = 422), among the donors who expressed willingness to donate HSCs to anyone in need (n=151), 74 (49%) of them were willing for subsequent donation of HSCs after initial donation. 64 (42.4%) of the donors were not sure about willingness and 13 (8.6%) of the donors were not willing for subsequent donation of HSCs.

6. Willingness for subsequent donation of blood or its components among those donors who expressed willingness to donate HSCs to anyone in need



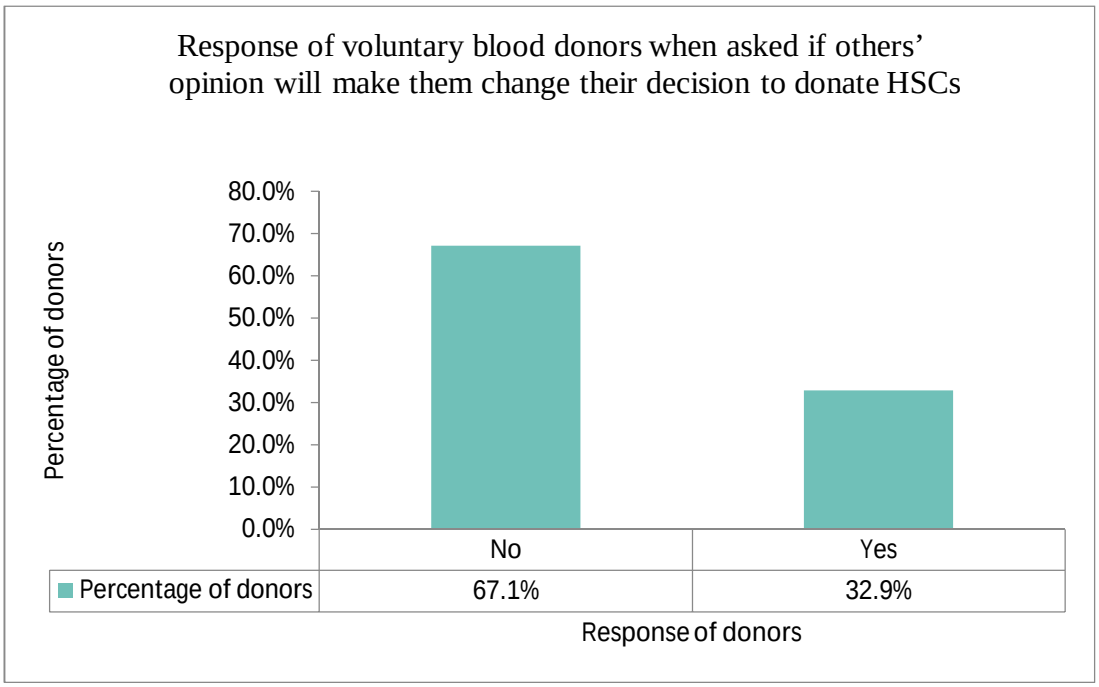
In this study population (N = 422), among the donors who expressed willingness to donate HSCs to anyone in need (n=151), 144 (95.4%) of them were willing for subsequent donation of blood or its components after initial donation of HSCs. 7 (4.6%) of the donors were not sure about willingness regarding subsequent donation of blood or its components after initial donation of HSCs.

7. Reasons given by voluntary blood donors who were not willing or not sure about willingness to donate HSCs



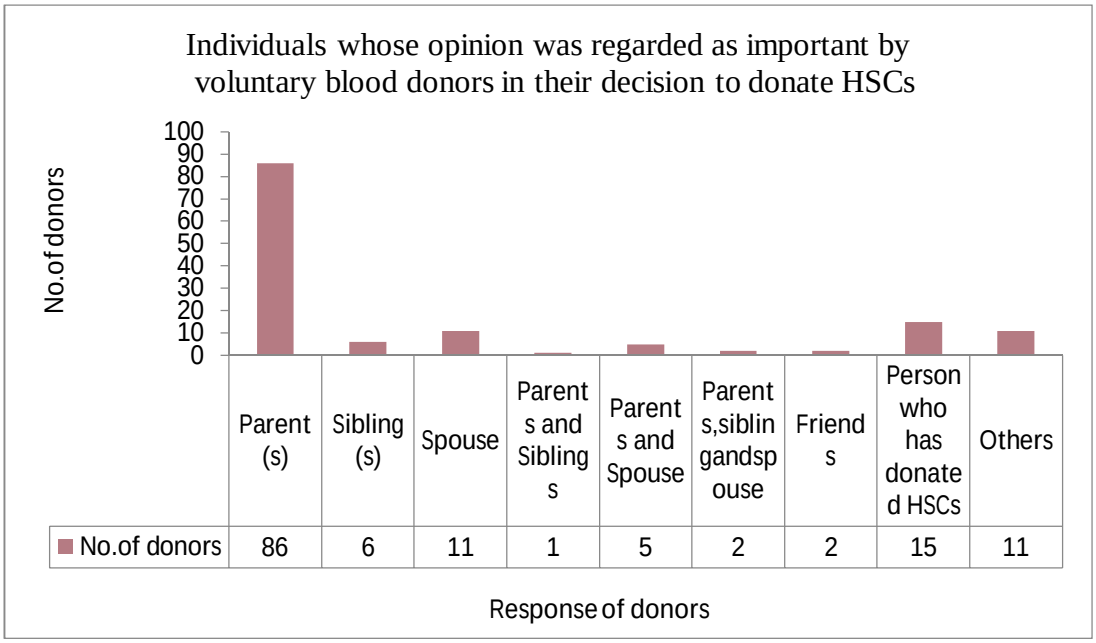
In this study population (N = 422), reasons given by donors who were not sure about willingness or not willing to donate HSCs (n=252) were risk / fear of side effects (36.5%), no interest in HSC donation (16.7%), need to know more about HSC donation (13.9%), need to discuss with family members (12.7%), HSC donation requires absence from work(11.5%), concern about personal situation(2.4%), duration of donation procedure(1.6%), PBSC donation requiring five days of injection prior to donation(1.2%) , concern for fitness to donate later, in future (1.2%), need to grow older to decide (0.8%), dependence of family members on the donor (0.8%), apheresis-related complications(0.4%), both risk/fear of side-effects and HSC donation requiring absence from work (0.4%).

8. Response of voluntary blood donors when asked if others' opinion will make them change their decision to donate HSCs



In this study population (N = 422), 283 (67.1%) of them responded that others' opinion would not make them change their decision regarding HSC donation. 139 (32.9%) of the donors responded that others' opinion would make them change their decision regarding HSC donation.

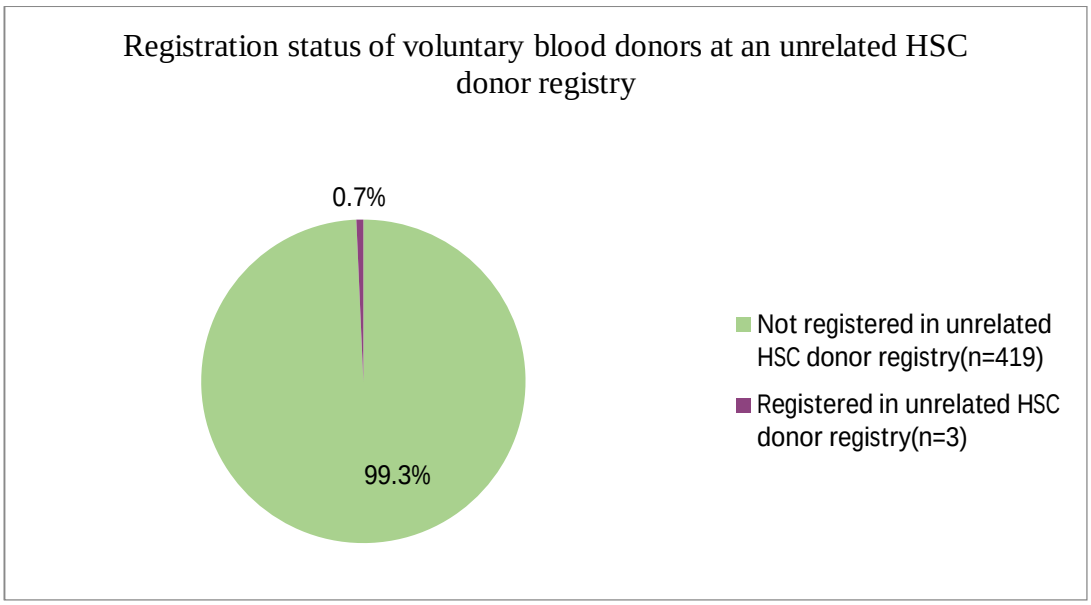
9. Individuals whose opinion was regarded as important by the voluntary blood donors in their decision to donate HSCs



In this study population (N = 422), among the donors who responded that others' opinion would make them change their decision regarding HSC donation (n =139), 111 (79.9%) of the donors considered the opinion of one or more family members to be important in their decision to donate HSCs. Opinion of friends, persons who have already donated HSCs and others, like family doctor, were considered important by 2 (1.4%), 15 (10.8%) and 11 (7.9%) donors, respectively.

IV. STATISTICS ON BEHAVIOUR

1. Registration status of voluntary blood donors at an unrelated HSC donor registry



In this study population (N = 422), 3 (0.7%) of the donors had registered and 419 (99.3%) of the donors were not registered at any unrelated HSC donor registry.

Donor-related factors and willingness to donate HSCs to unrelated individuals

VARIABLE		No. of donors (N=422)	No. of donors			df	Chi-square	p value
			Willingness to donate HSCs					
			Yes (n=170)	Yes to anyone (n=151)	No/Not sure (n=252)			
Age (years)	18-24	262	111	102	151	6	7.007	0.320
	25-44	146	53	43	93			
	45-60	14	6	6	8			
Gender	Male	402	163	144	239	3	1.047	0.790
	Female	20	7	7	13			
Marital status	Unmarried	313	132	119	181	3	2.760	0.430
	Married	109	38	32	71			
Education	Illiterate	1	0	0	1	15	8.15	0.918
	Primary school	1	0	0	1			
	Middle school	11	2	2	9			
	High school	34	12	12	22			
	High school diploma	205	68	68	137			
	Graduation/post-graduation	170	69	69	101			
Past history of blood donation	No	174	61	56	113	3	6.201	0.102
	Yes	248	109	95	139			
No. of units of blood donated in repeat donors (n=248)	<5 units	187	76	67	111	3	5.866	0.118
	>5 units	61	33	28	28			
History of apheresis donation	No	415	166	147	249	3	1.567	0.667
	Yes	7	4	4	3			
Level of knowledge	Below desirable	417	165	146	252	3	9.081	0.028
	Desirable	5	5	5	0			
Knows a person who needs HSCs as treatment	No	415	164	145	251	6	10.271	0.114
	Yes	7	6	6	1			

1. Age

102(38.9%), 43(29.5%) and 6(42.9%) donors in the 18-24 (n= 262), 25-44 (n= 146) and 45-60 (n=14) age groups, respectively, were willing to donate HSCs to anyone in need of HSCs as treatment. However, age of the donor was not significantly associated with willingness to donate HSCs.

2. Gender

144 (35.8%) and 7(35%) of the male (n=402) and female (n=20) donors, respectively, were willing to donate HSCs to anyone in need of HSCs as treatment. However, gender was not significantly associated with willingness to donate HSCs.

3. Marital status

119 (38%) and 32 (29.4%) of the unmarried (n= 313) and married (n=109) donors, respectively, were willing to donate HSCs to anyone in need of HSCs as treatment. However, marital status was not significantly associated with willingness to donate HSCs.

4. Education

69 (40.6%), 68 (33.2%), 12 (35.3%), and 2 (18.1%) of the donors who had completed graduation/postgraduation, high school diploma, high school and middle school, were willing to donate HSCs to anyone in need. None of

the donors who had completed only primary school or had no formal education were willing to donate HSCs to anyone in need of HSCs as treatment. However, education was not significantly associated with willingness to donate HSCs.

5. Blood donation

56 (32.2%) and 95 (38.3%) of the first-time (n=174) and repeat (n= 248) donors, respectively, were willing to donate HSCs to anyone in need of HSCs as treatment. 67 (35.8%) and 28 (45.9%) of the repeat donors who had donated less than (n=187) and more than (n=61) 5 units, respectively, were willing to donate HSCs to anyone in need of HSCs as treatment. However, number of units of blood donated was not significantly associated with willingness to donate HSCs.

6. Past history of apheresis

147 (35.4%) and 4(57.1%) of the donors without (n=415) and with (n=7) history of plateletpheresis donation, respectively, were willing to donate HSCs to anyone in need of HSCs as treatment. However, past history of apheresis donation was not significantly associated with willingness to donate HSCs.

7. Level of knowledge

146 (35%) and 5 (100%) of the donors with “below desirable” (n= 417) and “desirable” (n= 5) level of knowledge, respectively, were willing to donate to anyone in need of HSCs as treatment. Level of knowledge was significantly associated with willingness to donate HSCs.

8. Having a known person who needs HSCs as treatment

6 (85.7%) of the donors who had a known person who needed HSCs treatment (n=7), were willing to donate HSCs to anyone in need of HSCs as treatment. 145 (34.9%) of the donors who did not have a known person who needed HSCs treatment (n= 415), were willing to donate HSCs to anyone in need of HSCs as treatment. However, having a known person who needed HSCs as treatment was not significantly associated with willingness to donate HSCs.

DISCUSSION

KNOWLEDGE, ATTITUDE AND BEHAVIOUR IN VARIOUS STUDIES

PARAMETERS	CURRENT STUDY	Kwok et al [88]	Laver JH et al [100]	Kaya Z et al [102]	McCullough et al [104]	Varghese ST et al [99]	Onitilo AA et al [101]	Sanavi S et al [103]	Bart T et al [105]	Studts JL et al [86]
Awareness of HSC Donation	16.1%	-	-	-	-	18.5%	-	-	-	-
Awareness of HSC donor registry	2.4%	-	51.7%	-	-	-	42.9%	-	-	-
Awareness of purpose of HSC donation	50% of those who were aware of HSC donation	-	92%	-	-	-	92.8%	-	-	-
Knowledge level	98.8% below desirable; 1.2% desirable	-	-	-	-	69.1% inad ; 30.9% mod adeq;,none - adequate	-	-	-	-
Willing to donate HSCs	29.4% prior; 40.3% after information	-	-	65%- prior 76% after	-	-	-	-	-	49% after information
Preference among the willing persons	88.8% - anyone; 11.1% - family & known unrelated persons	25.5%- to family	-	-	-	-	-	16% - to family	-	-
Willingness to join registry	All 151 donors willing for unrelated HSC donation	51.5% of willing donors	-	-	-	-	44.7% of willing donors	-	-	-
Need for others' opinion	32.9% of donors ; majority - family member's opinion	-	-	-	54% of donors- spouse opinion	-	-	-	-	-
Registration status	0.7%	13.6%	-	-	-	-	-	-	22.8%	-

DISCUSSION

In the present study, among 422 voluntary blood donors, awareness about HSC donation was found to be 16.1% which is comparable to 18.5% reported in the study done by Varghese ST et al[99] among 81 engineering college students in Kerala.

In our study, the level of knowledge about HSC donation and unrelated donor HSC registry was "below desirable" in majority (98.8%) of the donors and "desirable" only in 5 (1.2%) of the donors. However, the study conducted among engineering college students in Kerala[99] with questions pertaining to the knowledge assessment about HSC donation revealed 30.9% and 69.1% of the participants with moderately adequate and inadequate knowledge, respectively; none of the participants had adequate knowledge about HSC donation.

In the present study, 2.4% of the voluntary blood donors were aware of unrelated HSC donor registry. However, in the studies done in South Carolina[100,101] among potential eligible HSC donors, 51.7% and 42.9% of them were aware of the unrelated HSC donor registry.

In our study, out of the 68 donors who were aware of HSC donation, 34 (50%) donors knew about the purpose of HSC donation, 3 (4.4%) donors were aware of the risks associated with HSC donation, 5 (7.4%) donors were

aware of the test to be done as a HSC donor. In similar studies done among potential eligible HSC donors in South Carolina,[100,101] 92% and 92.8% of them, respectively, were aware of HSC transplantation as a life-saving procedure.

In the present study, among 422 voluntary blood donors, 124 (29.4%) of the donors were willing to donate HSCs. The percentage of donors willing to donate HSCs increased from 29.4% to 40.3% after providing information on HSC donation and unrelated HSC donor registry. Kaya Z et al[102] in their study among college students in Turkey had reported similar increase in the percentage of participants expressing willingness for HSC donation after providing information. In another study by Studts JL et al[86] in Kentucky, 49% of the participants agreed to register at an unrelated HSC donor registry after providing necessary information with regard to HSC donation. Further, in our study, change in the attitude towards HSC donation was observed after providing information, notably among the donors who had responded “not sure” initially.

In our study, out of 170 donors who expressed their willingness after providing information, 151(88.8%) were willing to donate to anyone and all 151 of them were willing to join unrelated HSC donor registry. However, in the studies by Kwok J et al[88] and Onitilo AA et al[101] in Hong Kong and South Carolina, among potential HSC donors, only 51.5% and 44.7% of those who were willing to donate HSCs, respectively, expressed willingness to join the

registry. Such ambivalence was not noted in our study because of our study population being voluntary blood donors.

In the present study, among the 170 voluntary blood donors who were willing to donate HSCs, 19 (11.1 %) of them were willing to donate HSCs only to family and known unrelated individuals. However, in studies done in Iran and Hong Kong,[103,88] among high school students and potential eligible HSC donors who were willing to donate HSCs, 16% and 25.5% of them, respectively, expressed willingness to donate only to their family members. The lower percentage noted in our study compared to these studies could be due to our study population being voluntary blood donors who are characterised by their altruistic nature.

In the present study, among 422 voluntary blood donors, 252(59.7%) of them were either “not sure about decision” or “not willing” to donate HSCs.

The most frequently noted reasons in the order of priority were concern about side effects and complications of HSC donation, lack of interest in HSC donation, need to know more about HSC donation, need to discuss with family members and time-off from work required for HSC donation. In studies done by Kwok J et al[88] and Ontilo AA et al[101] among potential eligible HSC donors, the reasons for unwillingness to donate HSCs were of similar nature.

About 5 to 10% of the HSC donors may be requested for a subsequent donation of HSCs or blood components after initial HSC donation.[95] In this regard, 49% and 95.4% of the donors in our study expressed willingness for subsequent HSC and blood component donation, respectively.

In our study, among the 422 voluntary blood donors, 139 (32.9%) donors responded that others' opinion would influence their decision regarding HSC donation. Among these donors, majority (79.9%) considered that the opinion of one or more family members would influence their attitude regarding HSC donation. The remaining small proportion of the donors (20.1%) felt that the opinion of people who have already donated HSCs, friends and family doctor and were important. McCullough J et al[104] in their study among 150 whole blood or apheresis donors in Minnesota reported that 54% of the donors had discussed with another person, most commonly the spouse, before enrolling in unrelated HSC donor registry.

In the present study, among the 422 voluntary blood donors, only 3 donors were already registered at an unrelated HSC donor registry. These 3 donors had enrolled during a HSC recruitment drive in their college. The studies done among general population by Kwok J et al[88] and Bart T et al[105] revealed that 13.6 % and 22.8%, respectively, were already registered at an unrelated HSC donor registry.

MASTER CHART FOR DONOR – RELATED FACTORS AND WILLINGNESS FOR UNRELATED HSC DONATION

FACTORS	CURRENT STUDY	Kwok et al [88]	Laver JH et al [100]	Kim et al [107]	Onitilo AA et al [101]	Sanavi et al [103]	Beatty PG et al [19]	Volken T et al [106]	Galanis PA [109]	Briggs et al [108]	Studts JL et al [86]
1.Age: Significant association with willingness?	No	Yes	-	-	Yes	-	No	No	-	-	-
2.Gender : Significant association with willingness?	No	No	-	Yes	No	-	No	No	-	Yes	Yes
3.Marital status Significant association with willingness?	No	-	-	-	-	-	-	-	-	Yes	Yes
4. Education Significant association with willingness?	No	Yes	Yes	-	Yes	No	-	No	-	No	-
5. No. of blood units donated Significant association with willingness?	No	-	-	-	-	-	Yes	-	-	Negatively related	-
6. Apheresis donation Significant association with willingness?	No	-	-	-	-	-	-	-	-	Negative related	-
7. Knowledge level Significant association with willingness?	Yes	Yes	-	-	-	-	-	-	-	-	-
8. Knowing person who needs HSCs Significant association with willingness?	No	-	-	-	-	-	-	-	Yes	-	Yes

Donor-related factors and willingness to donate HSCs to unrelated individuals

Age

In our study, higher proportion of donors in the 18-24 (38.9%) and 45-60 (42.9%) years age group than in the 25-44 (29.5%) years age group expressed willingness to donate HSCs to anyone in need of HSCs as treatment. However, age was not significantly associated (p = 0.320) with willingness to donate HSCs, similar to the study results obtained by Volken T et al[106] and Beatty PG et al[19]. However, in the study by Kwok J et al,[88] it was reported that respondents were more willing to donate to unrelated individuals if they were in the age groups of 18-46 years. Onitilo AA et al[101] also reported in their study that younger individuals were more willing to donate HSCs.

Gender

In our study, almost equal proportions of male and female donors (35.8% and 35%, respectively) expressed willingness to donate HSCs to anyone in need of HSCs as treatment. However, gender was not significantly associated with willingness to donate HSCs (p = 0.790). This was similar to results of the studies by Volken T[106], Kwok J et al[88], Onitilo AA et al[101] and Beatty PG et al.[19]

However, less male students showed intention to donate HSCs than female students in the study by Kim M et al[107]. Studts JL et al[86] in their study

also reported that females were more likely to agree to register at an unrelated HSC donor registry. However, in the study by Briggs et al[108] it was reported that women were less likely to express willingness to donate HSCs than men.

Marital status

In the present study, higher proportions of unmarried donors (38%) than married donors (29.4%) were willing to donate HSCs to anyone in need of HSCs as treatment. However, marital status was not significantly associated ($p = 0.430$) with willingness to donate HSCs. Briggs et al[108] showed that married people were less likely to express willingness to donate HSCs than unmarried people. However, Studts JL et al[86] had reported in their study that married participants were more likely to agree to register at an unrelated HSC donor registry.

Education

In the present study, higher proportion of donors who had completed graduation/postgraduation, high school diploma and high school than those in the other levels of education were willing to donate HSCs to anyone in need of HSCs as treatment. However, education was not significantly associated ($p = 0.918$) with willingness to donate HSCs. This was similar to the findings of Volken T et al[106], Sanavi S et al[103] and Briggs et al[108] in their studies. However, studies by Onitilo AA et al[101], Kwok J et al[88] and Laver JH et al[100]

showed that individuals with higher levels of education were more willing to donate HSCs.

Whole blood donation

In the present study, higher proportion of repeat donors (38.3%) than first time donors (32.2%) were willing to donate HSCs to anyone in need of HSCs as treatment. Also, higher proportion of repeat donors who had donated more than 5 units (45.9%) than those who had donated less than 5 units of blood (35.8%), were willing to donate HSCs to anyone in need of HSCs as treatment. However, the number of units of blood donated was not significantly associated ($p = 0.118$) with willingness to donate HSCs. However, in the study by Beatty PG et al,[19] donors who had given 5 or fewer units previously had a 5 % probability of joining, donors who had given between 16 and 20 units had a 38 % probability, and donors with a history of more than 20 units had a 60 % probability. In contrast, results of the study by Briggs et al[108] showed that the number of prior whole blood donations was negatively related to willingness to become a HSC donor.

Apheresis donation

In the present study, higher proportion of donors with history of plateletpheresis (57.1%) donation than those without history of apheresis donation (35.4%), were willing to donate HSCs to anyone in need of HSCs as treatment. However, past history of apheresis donation was not significantly

associated (p = 0.667) with willingness to donate HSCs. However, in the study by Briggs et al,[108] prior apheresis donation was negatively related to willingness to become a HSC donor.

Level of knowledge

In the present study, higher proportion of donors with "desirable" level of knowledge (100%) than those with "below desirable" level of knowledge (35%), were willing to donate to anyone in need of HSCs as treatment. Level of knowledge was significantly associated (p = 0.028) with willingness to donate HSCs which is similar to the results of the study by Kwok J et al[88] in which higher knowledge scores were related to willingness to donate HSCs to unrelated individuals.

Having a known person who needs HSCs as treatment

In the present study, higher proportion of donors who had a known person needing HSCs as treatment (85.7%) than those who did not (34.9%), were willing to donate to anyone in need of HSCs as treatment. However, having a known person who needs or has needed HSCs as treatment was not significantly associated (p = 0.114) with willingness to donate HSCs. In the study by Galanis PA et al[109] persons with a relative or a friend in need of HSCT were more likely to express willingness to donate HSCs. Also, results of the study by Studts JL et al[86] showed that participants who had a family history of cancer were more likely to agree to register.

SUMMARY

SUMMARY

The present study on knowledge, attitude and behaviour (KAB) among 422 voluntary blood donors, using pre-and post-interventional study questionnaire, revealed

- Awareness about HSC donation in 16.1 % (68 out of 422) of the donors.
- Awareness about unrelated HSC donor registry in 2.4 % (10 out of 422) of the donors
- “Desirable” knowledge in 1.2 % (5 out of 422) of the donors and “below desirable” knowledge in 98.8% (417 out of 422) of the donors.
- Prior to providing information about HSC donation and unrelated HSC donor registry, 53.1% (224 out of 422) of the donors were not sure about willingness, 29.4 % (124 out of 422) of the donors were willing and 17.5% (74 out of 422) of the donors were unwilling to donate HSCs.
- After providing information on HSC donation and unrelated HSC donor registry, 40.3% (170 out of 422) of the donors were willing to donate HSCs.

- After providing information, the change in attitude towards HSC donation was most notable (54.9%) among the category of donors who responded “not sure” initially.

- Among the 170 donors who were willing to donate HSCs, 88.8% (151 out of 170) of the donors were willing to donate to anyone in need of HSCs as treatment.

- All the 151 donors who were willing to donate to anyone, were willing to join unrelated HSC donor registry.

- Among the 151 donors who were willing to donate HSCs to anyone, 49% (74 out of 151) and 95.4% (144 out of 151) of them were willing for subsequent donation of HSCs and blood components, respectively, after initial HSC donation.

- Major reasons among donors who did not have a positive attitude about HSC donation were concern about side effects and complications of HSC donation, lack of interest in HSC donation, need to know more about HSC donation, need to discuss with family members and time-off from work required for HSC donation.

- 32.9% (139 out of 422) of the donors considered that others’ opinion would make them change their decision regarding HSC donation.79.9% (111 out of 139) of these donors considered the

opinion of one or more family members and 20.1% of the donors considered the opinion of people who have already donated HSCs, friends and others like family doctor, as important in their decision regarding HSC donation.

- 3 out of 422 donors had already registered at an unrelated HSC donor registry.

- Level of knowledge of the donor regarding HSC donation and unrelated HSC donor registry was significantly associated with willingness to donate HSCs to unrelated individuals. Other factors like age, gender, marital status, education, number of blood units donated, prior plateletpheresis donation and having a known person who needed HSCs as treatment, were not significantly associated with willingness to donate HSCs to unrelated individuals.

CONCLUSION

CONCLUSION

The present study revealed the existing knowledge, attitude and behaviour (KAB) among voluntary blood donors regarding HSC donation and unrelated HSC donor registry.

Knowledge plays a vital role in shaping the attitude towards HSC donation. Moreover, voluntary blood donors with positive attitude towards HSC donation need adequate opportunities to act upon their intentions.

Strategies like involving people who have experienced HSC donation and those who are important in the decision-making process of potential HSC donors, may be useful for motivation regarding unrelated HSC donation.

Given the wide range of disease conditions potentially curable by allogeneic HSCT and the dependence of considerable number of patients on unrelated HSC donors, it is imperative to intensify awareness and recruitment campaigns among voluntary blood donors.

In a developing country like India with lack of awareness about unrelated HSC donation and relatively less number of volunteers registered as potential HSC donors compared to developed nations, it is high time for policy-makers to take dedicated initiatives to address these issues for improving health care in our country.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Bone Marrow Donors Worldwide. http://www.bmdw.org (accessed 24 Aug 2016).

2. Gebel HM, Pollack MS JD, Bray RA. The HLA system. In: Roback JD (eds.) Technical Manual. 17th ed. Bethesda, Maryland: AABB; 2011.p.547-69.

3. Bergstrom TC, Garratt RJ, Sheehan-Connor D. One Chance in a Million: Altruism and the Bone Marrow Registry. Am Econ Rev. 2009 Sep;99:1309-34.

4. Tiwari AK, Bhati-Kushwaha H, Kukreja P, et al. Probability of finding marrow unrelated Donor (MUD) for an Indian patient in a Multi-national Human Leukocyte Antigen (HLA) Registry. Indian J Hematol Blood Transfus. 2015 Jun;31(2):186-95.

5. Maiers M, Halagan M, Joshi S, et al. HLA match likelihoods for Indian patients seeking unrelated donor transplantation grafts: a population-based study. Lancet Haematol. 2014 Nov;1(2):57-63.

6. Kannan R. Finding bone marrow donors, a daunting task. The Hindu. Nov18, 2012. http://www.thehindu.com/news/national/tamil-nadu/finding-bone-marrow-donors-a-daunting-task/article4106473.ece(accessed 18 May 2016).

7. Gupta BM, Bala A. Bone Marrow Research in India: A Scientometric Study, 2003-12. J Bone Marrow Res. 2013;1(1).

8. Chandy M. Stem cell transplantation in India. Bone Marrow Transplant. 2008;42:S81-S84.

9. Shah CA, Karanwal A, Desai M, et al. Hematopoietic Stem-Cell Transplantation in the developing World: Experience from a center in Western India. J Oncol. 2015 Feb.

10. Vardhan relaunches Asian Indian Donor Marrow Registry at AIIMS. Business Standard. Aug 6, 2014. http://www.business-standard.com/article/pti-stories/vardhan-relaunches-asian-indian-donor-marrow-registry-at-aiims-114080601272_1.html (accessed 9 Aug 2016).

11. DATRI successfully facilitates its 100th blood stem cell donation. BioSpectrum.June3,2015. http://www.biospectrumindia.com/biospecindia/news/221425/datri-successfully-facilitates-100th-blood-stem-cell-donation (accessed 15 Aug 2016).

12. World Health Day: DATRI successfully facilitates over 150 blood stem cell donations. BioVoice.Apr7,2016.http://www.biovoicenews.com/world-health-day-datri-successfully-facilitates-over-150-blood-stem-cell-donations/ (accessed 9 Aug 2016).

13. Treating cancer: Why it is difficult to find donors for bone marrow transplants in India. Scroll.in.Jul 30, 2015.http://scroll.in/article/741410/treating-cancer-why-it-is-difficult-to-find-donors-for-bone-marrow-transplants-in-india (accessed 24 Aug 2016).

14. Dedhia L, Parekh S. Challenges faced by bone marrow registries in India. Indian J Transplant. 2014;8:80-3.

15. Parikh SH, Kurtzberg J. Umbilical Cord Blood: A Reliable Source of Stem and Progenitor Cells for Human Transplantation. In: Simon TL

(eds.) Rossi's Principles of Transfusion Medicine. 4th ed. West Sussex, UK: Blackwell Publishing Ltd; 2009, p.559-65.

16. McKenna D, Sheth J. Umbilical cord blood: Current status & promise for the future. Indian J Med Res. 2011 Sep;134(3):261-9.

17. Sacchi N, Costeas P, Hartwell L, et al. Hematopoietic Stem Cell Registries: WMDA definitionsofaDonorCenter. https://www.wmda.info/images/Recommendations/DC.pdf (accessed 30 Jul 2016).

18. Butterworth VA, Simmons RG, Bartsch G, et al. Psychosocial Effects of Unrelated Bone Marrow Donation: Experiences of the National Marrow Donor Program. Blood. 1993 Apr;81(7):1947-59.

19. Beatty PG, Atcher C, Hess E, et al. Recruiting blood donors into a local bone marrow donor registry. Transfusion. 1989 Nov-Dec;29(9):778-82.

20. Aprili G, Bosi A, Lombardini L, et al. Recommendations for managing the donation of haematopoietic stem cells from related and unrelated donors for allogeneic transplantation. Blood Transfus. 2013 Apr;11(2):296-304.

21. India Needs Database of Blood Stem Cell Donors: Doctor. The Economic Times. Oct 30,2015.http://economictimes.indiatimes.com/industry/healthcare/ biotech/healthcare/india-needs-database-of-blood-stem-cell-donors-doctor/ articleshow/49593381.cms(accessed10 Aug 2016).

22. Schmidt AH. Potential for increased stem-cell donor recruitment in India. Lancet Haematol.2014 Nov;1(2):e48-9.

23. Baranowski T, Cullen KW, Nicklas T, et al. Are Current Health Behavioral Change Models Helpful in Guiding Prevention of Weight Gain Efforts? Obes Res. 2003 Oct;11, Suppl:23S-43S.

24. Das S. Safe Transfusion Practices: Challenges and Opportunities. J Clin Biomed Sci. 2013;3(2):55-61.

25. Manikandan S, Srikumar R, Ruvanthika PN. A Study on Knowledge, Attitude and Practice on Blood Donation among Health Professional Students in Chennai, Tamil Nadu, South India. International Journal of Scientific and Research Publications. 2013. Mar;3(3):1-3.

26. Crookston KP, Wilkinson SL, Simon TL. Recruitment and Screening of Donors and the Collection, Processing, and Testing of Blood. In: Simon TL (eds.) Rossi's Principles of Transfusion Medicine. 4th ed. West Sussex, UK: Blackwell Publishing Ltd; 2009.p.975-92.

27. Crookston KP, Pritchard AE, Simon TL. Recruitment and screening of donors and the collection, processing, and testing of blood. In: Simon TL (eds.) Rossi's Principles of Transfusion Medicine. 5th ed. West Sussex, UK: John Wiley & Sons, Ltd; 2016, p.30-42.

28. Prasad R. Voluntary donation, safe blood. The Hindu. June 14, 2016. http://www.thehindu.com/opinion/op-ed/voluntary-donation-safe-blood/article8724868.ece (accessed 24 Aug 2016).

29. National AIDS Control Organisation (NACO), Ministry of Health & Family welfare, Government of India. Voluntary Blood Donation Programme - An Operational Guideline. New Delhi. NACO; 2007. p.13.

30. Evans R, Ferguson E. Defining and measuring blood donor altruism: a theoretical approach from biology, economics and psychology. Vox Sang. 2014 Feb;106(2):118-26.

31. Lown RN, Philippe J, Navarro W, et al. Unrelated adult stem cell donor medical suitability: recommendations from the World Marrow Donor Association Clinical Working Group Committee. Bone Marrow Transplant. 2014 Jul;49 (7):880-6.

32. Shaw BE, Ball L, Beksac M, et al. Donor safety: the role of the WMDA in ensuring the safety of volunteer unrelated donors: clinical and ethical considerations. Bone Marrow Transplant. 2010 May;45(5):832–8.

33. McQuellon RP, Andrykowski M. Psychosocial issues in hematopoietic cell transplantation. In: Appelbaum FR (eds.) Thomas' Hematopoietic Cell Transplantation. 4th ed. West Sussex, UK: Blackwell Publishing Ltd; 2009.p. 488-501.

34. Theodore M., Mathur A., Jagannathan L, et al. LIFE DE INDIA: A pilot project to enrol voluntary unrelated stem cell donors from voluntary whole-blood donors. Abstract of 34 th Annual Conference of ISBTI 20-22 November 2009, New Delhi. Asian J Transfus Sci 2010;4:43-69.

35. Ljungman P, Bregni M, Brune M. Allogeneic and autologous transplantation for haematological diseases, solid tumours and immune disorders: current practice in Europe 2009. Bone Marrow Transplant. 2010 Feb;45 (2):219-34.

36. Celso CL, Scadden DT. The haematopoietic stem cell niche at a glance. J of Cell Sci. 2011 Nov;124 (Pt21):3529-35.

37. Morrison SJ, Scadden DT. The bone marrow niche for haematopoietic stem cells. Nature.2014 Jan;505(7483):327-34.

38. Baron MH, Isern J, Fraser ST. The embryonic origins of erythropoiesis in mammals. Blood. 2012 May;119 (21):4828-37.

39. Circulating body fluids. In: Ganong WF. Review of Medical Physiology. 21st ed. India: The McGraw-hill Companies, Inc; 2003.p.517-48.

40. Martinez-Agosto JA, Mikkola HK, Hartenstein V, et al. The hematopoietic stem cell and its niche: a comparative view. Genes Dev.2007 Dec;21(23): 3044-60.

41. Seita J, Weissman IL. Hematopoietic Stem Cell: Self-renewal versus Differentiation. Wiley Interdiscip Rev Syst Biol Med. 2010 Nov-Dec;2(6):640-53.

42. Henig I, Zuckerman T. Hematopoietic stem cell transplantation-50 years of evolution and future perspectives. Rambam Maimonides Med J. 2014 Oct;5(4).doi: 10.5041/RMMJ.10162. (accessed 19 May 2016).

43. Horowitz MM. Uses and growth of hematopoietic cell transplantation. In: Appelbaum FR (eds.) Thomas' Hematopoietic Cell Transplantation. 4th ed. West Sussex, UK: Blackwell Publishing Ltd; 2009.p.15-21.

44. Gaballa S, Alousi A, Giralt S, et al. Hematopoietic stem cell transplantation. In: Simon TL (eds.) Rossi's Principles of Transfusion Medicine. 5th ed. West Sussex,UK: John Wiley & Sons, Ltd; 2016. p. 440-51.

45. Lingard JR, Majhail NS, Brazauskas R, et al. Long-Term Survival and Late Deaths After Allogeneic Hematopoietic Cell Transplantation. J Clin Oncol. 2011 Jun;29(16):2230-9.

46. McCullough J. Hematopoietic stem cells and cord blood.In: Simon TL (eds.) Rossi's Principles of Transfusion Medicine. 5th ed. West Sussex, UK: John Wiley & Sons,Ltd; 2016.p.430-9.

47. Nemecek ER. Marrow harvesting: practice makes perfect. Transfusion. 2016 May; 56(5):1005.

48. Miller JP, Perry EH, Price TH, et al. Recovery and safety profiles of marrow and PBSC donors: experience of the National Marrow Donor Program. Biol Blood Marrow Transplant. 2008 Sep;14(9):29-36.

49. Leemhuis T, Sacher RA. Hematopoietic Progenitor Cells: Biology and Processing. In: Simon TL (eds.) Rossi's Principles of Transfusion Medicine. 4th ed. West Sussex, UK: Blackwell Publishing Ltd; 2009. p.508-520.

50. Horowitz MM, Confer DL. Evaluation of hematopoietic stem cell donors. Hematology Am Soc Hematol Educ Program. 2005:469-75.

51. Lapidot T, Petit I. Current understanding of stem cell mobilization: The roles of chemokines, proteolytic enzymes, adhesion molecules, cytokines, and stromal cells. Exp Hematol.2002 Sep;30(9):973-81.

52. Alvarez P, Carrillo E, Velez C, et al. Regulatory Systems in Bone Marrow for Hematopoietic Stem/Progenitor Cells Mobilization and Homing. Biomed Res Int. 2013 doi: 10.1155/2013/312656. (accessed 14 Jun 2016).

53. Bendall LJ, Bradstock KF. G-CSF: From granulopoietic stimulant to bone marrow stem cell mobilizing agent. Cytokine Growth Factor Rev. 2014 Aug;25(4):355-67.

54. Koepsell SA, Jacob EK, McKenna DH. The collection and processing of hematopoietic stem cells. In: Fung MK (eds.) Technical Manual. 18th ed. Maryland: AABB; 2014.p.713-728.

55. Tiercy JM. How to select the best available related or unrelated donor of hematopoietic stem cells? Hematologica. 2016 Jun;101(6):680-7.

56. Bray RA, Pollack MS, Gebel HM. The HLA system. In: Fung MK (eds.) Technical Manual. 18th ed. Maryland: AABB; 2014.p.475-97.

57. Naper C, Solheim BG. HLA antigens and alleles. In: Simon TL (eds.) Rossi's Principles of Transfusion Medicine. 5th ed. West Sussex, UK: John Wiley & Sons, Ltd; 2016.p.456-63.

58. Mickelson E, Petersdorf EW. Histocompatibility. In: Appelbaum FR (eds.) Thomas' Hematopoietic Cell Transplantation. 4th ed. West Sussex, UK: Blackwell Publishing Ltd; 2009.p.145-62.

59. Phelan DL, Morris GP. The HLA system. In: Harmening DM. Modern blood-banking & transfusion practices.6th ed. India. Jaypee Brothers Medical Publishers (P) Ltd. p.475-94.

60. Martin PJ. Overview of hematopoietic cell transplantation immunology. In: Appelbaum FR (eds.) Thomas' Hematopoietic Cell Transplantation. 4th ed. West Sussex, UK: Blackwell Publishing Ltd; 2009.p.131-44.

61. Tiercy JM. Unrelated Hematopoietic Stem Cell Donor Matching Probability and Search Algorithm. Bone Marrow Res. 2012. doi: 10.1155/2012/695018. (accessed 2 Aug 2016).

62. Petersdoff EW. Hematopoietic cell transplantation from unrelated donors. In: Appelbaum FR (eds.) Thomas' Hematopoietic Cell Transplantation. 4th ed. West Sussex, UK: Blackwell Publishing Ltd; 2009.p.675-91.

63. Kanga U, Panigrahi A, Kumar S, et al. Asian Indian Donor Marrow Registry: All India Institute of Medical Sciences experience. Transplant Proc. 2007 Apr;39(3):719-20.

64. Petersdorf EW. The World Marrow Donor Association: 20 years of international collaboration for the support of unrelated donor and cord blood hematopoietic cell transplantation. Bone Marrow Transplant. 2010 May;45(5): 807-10.

65. Hurley CK, Raffoux C. World Marrow Donor Association: international standards for unrelated hematopoietic stem cell donor registries. Bone Marrow Transplant. 2004 Jul;34(2):103-10.

66. Sacchi N, Costeas P, Hartwell L, et al. Haematopoietic stem cell donor registries: World Marrow Donor Association recommendations for evaluation of donor health. Bone Marrow Transplant. 2008 Jul;42(1):p.9-14

67. World Marrow Donor Association. 20140101-STDS-WMDA standards. International Standards for Unrelated Hematopoietic Progenitor Cell Donor Registries. 2014.

68. Hurley CK, Foeken L, Horowitz M, et al. Standards, regulations and accreditation for registries involved in the worldwide exchange of hematopoietic stem cell donors and products. Bone Marrow Transplant. 2010 May;45(5):819-24.

69. Anthony Nolan. Our history. https://www.anthonynolan.org/ (accessed 15 Aug 2016).

70. Foeken LM. Green A, Hurley CK, et al. Monitoring the international use of unrelated donors for transplantation: the WMDA annual reports. Bone Marrow Transplant. 2010 May;45(5):811-8.

71. Guinness World Records. http://www.guinnessworldrecords.com/world-records/most-bone-marrow-donors-recruited-in-24-hours/ (accessed 19 May 2016).

72. Dey S. Stem cell registry will make cancer treatment cheaper. The Times Of India. Dec 30, 2014. http://timesofindia.indiatimes.com/india/Stem-cell-registry-will-make-cancer-treatment-cheaper/articleshow/45682971.cms (accessed 15 Aug 2016).

73. Vardhan is first to give marrow registry blood. The Times Of India. Aug 7, 2014. http://timesofindia.indiatimes.com/city/delhi/Vardhan-is-first-to-give-marrow-registry-blood/articleshow/39771942.cms (accessed 18 May, 2016).

74. DATRI Blood Stem Cell donors registry. http://datri.org/ (accessed 15 Aug 2016).

75. Singh S. India's first bone marrow registry matches 9 donors to transplant seekers. Hindustan Times.http://www.hindustantimes.com/mumbai/india-s-first-bone-marrow-registry-matches-9-donors-to-transplant-seekers/story-KoPS0LjwmiBa20DdbUo4gL.html.Jun 5, 2015. (accessed 9 Aug 2016).

76. Marrow Donor Registry of India launches Gujarat chapter. Business Standard. July 5, 2014. http://www.business-standard.com/article/pti-stories/marrow-donor-registry-of-india-launches-gujarat-chapter-114070500525_1.html (accessed 9 Aug 2016).

77. Bangalore Medical Services Trust. http://www.bmstindia.org/ (accessed 19 Aug 2016).

78. Volunteer Whiteboard. http://whiteboardindia.org/?p=959 (accessed 15 Aug 2016).

79. Registry to help patients find stem cell matches. The Hindu. May 19, 2015. http://www.thehindu.com/news/cities/chennai/registry-to-help-

patients-find-stem-cell-matches/article7221338.ece (accessed 15 Aug 2016).

80. Charan S. Marrow registry eyes 10,000 donors. Bangalore Mirror. March 2, 2015. http://www.bangaloremirror.com/bangalore/others/Marrow-registry-eyes-10000-donors/articleshow/46423581.cms? (accessed 18 May 2016).

81. Rosenmayr A, Hartwell L, Egeland T. Informed Consent – suggested procedures for informed consent for unrelated haematopoietic stem cell donors at various stages of recruitment, donor evaluation, and donor workup. Bone Marrow Transplant. 2003 Apr; 31(7):539-45.

82. Elger BS, Cabrera L. Ethical ways to increase donation of hematopoietic stem cells. Bioethica Forum 2012;5(3):92-9.

83. Stroncek D, Strand R, Hofkes C, et al. The changing activities of a regional marrow donor program. Transfusion. 1994 Jan;34(1):58-62.

84. Schmidt AH, Biesinger L, Baier D, et al. Aging of registered stem cell donors: implications for donor recruitment. Bone Marrow Transplant. 2008 Apr;41(7):605-12.

85. Kollman C, Howe CW, Anasetti C, et al. Donor characteristics as risk factors in recipients after transplantation of bone marrow from unrelated donors: the effect of donor age. Blood.2001 Oct;98(7):2043-51.

86. Studts JL, Ruberg JL, McGuffin SA, et al. Decisions to register for the National Marrow Donor Program: rational vs emotional appeals. Bone Marrow Transplant. 2010 Mar;45(3):422-8.

87. World Marrow Donor Day. http://www.worldmarrowdonorday.org/ (accessed 9 Aug 2016).

88. Kwok J, Leung E, Wong W, et al. Factors Influencing Hematopoietic Stem Cell Donation Intention in Hong Kong: A Web-Based Survey. Ann Transplant. 2015 Oct;20:604-13.

89. Hurley CK, Oudshoorn M, Setterholm M. Donor Registries and Search Strategies. Methods Mol Biol. 2012; 882: 531-47. doi:10.1007/978-1-61779-842-9_30. (accessed 2 Aug 2016).

90. Wiegand T, Raffoux C, Hurley CK, et al. A special report: suggested procedures for international unrelated donor search from the donor registries and quality assurance working groups of the World Marrow Donor Association (WMDA). Bone Marrow Transplant.2004 Jul;34(2):97-101.

91. Steiner D. Computer Algorithms in the Search for Unrelated Stem Cell Donors. Bone Marrow Res.2012.

92. Bakken R, van Walraven AM, Egeland T, et al. Donor commitment and patient needs.Bone Marrow Transplant. 2004 Jan;33(2):225-30.

93. Vasconcellos A, Nunes A, Feller E. Knowledge, attitudes and behaviours regarding the bone marrow registry among college and medical students in Rhode Island. Medicine & Health Rhode Island.2011 Oct; 94(10):302.

94. Hurley CK, Wade JA, Oudshoorn M, et al. Histocompatibility testing guidelines for hematopoietic stem cell transplantation using volunteer donors: report from The World Marrow Donor Association. Bone Marrow Transplant. 1999 Jul;24(2):119-21.

95. Confer DL, Shaw BE, Pamphilon BH. WMDA guidelines for subsequent donations following initial BM or PBSCs. Bone Marrow Transplant. 2011 Nov;46(11):1409-12.

96. Department of Biotechnology & Indian Council of medical research, Government of India. Guidelines for Stem Cell Research and therapy. New Delhi: Director General Indian Council of Medical Research; 2007. p.12.

97. Gowda M, Ambardar S, Dighe N, et al. Comparative Analyses of Low, Medium and High-Resolution HLA Typing Technologies for Human Populations. J Clin Cell Immunol 2016;7(2). doi:10.4172/2155-9899.1000399. (accessed 31 Jul 2016).

98. Switzer GE, Dew MA, Butterworth VA, et al. Understanding donors' motivations: a study of unrelated bone marrow donors. Soc Sci Med. 1997 Jul;45(1):137-47.

99. Varghese ST, Hem M. Peripheral blood stem cell donation awareness among college students. International Journal of Science, Technology & Management. 2015 June;4(6). http://www.ijstm.com/images/short_pdf/1433173321_P1-5.pdf (accessed 19 May 2016).

100. Laver JH, Hulsey TC, Jones JP, et al. Assessment of Barriers to Bone Marrow Donation by Unrelated African-American Potential Donors. Biol Blood Marrow Transplant. 2001;7(1):45-8.

101. Onitilo AA, Lin YH, Okonofua EC, et al. Race, education and knowledge of bone marrow registry: indicators of willingness to donate bone marrow among African Americans and Caucasians. Transplant Proc. 2004 Dec; 36(10):3212-9.

102. Kaya Z, Gültekin KE, Demirtaş OK, et al. Effects of targeted education for first-year University students on knowledge and attitudes about stem cell transplantation and donation. Exp Clin Transplant.2015 Feb; 13(1):76-81.

103. Sanavi S, Afshar R, Sanavi N, et al. Attitude and willingness towards tissue donation in Iranian high school students: bone marrow and blood. Int J Organ Transplant Med. 2011; 2(4):184-7.

104. McCullough J, Rogers G, Dahl R, et al. Development and operation of a program to obtain volunteer bone marrow donors unrelated to the patient. Transfusion. 1986 Jul- Aug;26(4):315-23.

105. Bart T, Volken T, Fischer Y et al. Giving blood and enrolling on the stem cell donor registry: ranking of obstacles and motives in Switzerland. Transfus Med Hemother 2014; 41:264–72.

106. Volken T, Bart T, Rüesch P , et al. Intentions to register as a donor at the Swiss Blood Stem Cell Registry http://www.samw.ch/dms/de/Forschung/Bangerter/Symposium-2012/Poster/25_Volken.pdf (accessed 22 May 2014).

107. Kim M, Ahn H. Student Nurses' Knowledge, Attitude, and Intention for Hematopoietic Stem Cell Donation in Korea. Advances in information Sciences and Service Sciences. 2013 Oct;5(15).145-51.

108. Briggs NC, Piliavin JA, Lorentze D. On willingness to be a bone marrow donor. Transfusion. 1986; 26(4):324-30.

109. Galanis PA, Sparos LD, Katostaras et al. Factors that influence Greeks' decision to register as potential bone marrow donors. Transplant Proc. 2008 Jun;40 (5):1271-4.

110. Choo SY. The HLA system: genetics, immunology, clinical testing, and clinical implications. Yonsei Med J. 2007 Feb. 48(1); 11-23.

111. Donors selection and blood collection. In: Saran RK. Transfusion Medicine Technical Manual.2nd edition. Mehta Offset Pvt limited; 2003:p.7-21.

112. Oberoi SS. Updating Income Ranges for Kuppuswamy's Socio-Economic Status Scale for the Year 2014. Indian J Public Health. 2015 Apr-Jun;59(2):156-7.

113. Davis-Sproul J, Haley N R. Collecting and Processing Marrow Products for Transplantation. In: Roback JD (eds.) Technical Manual. 17th ed. Bethesda, Maryland: AABB; 2011.p.779-799.

114. Lane TA, McMannis JD. Hematopoietic Progenitor Cells Collected by Apheresis. In: Roback JD (eds.) Technical Manual. 17th ed. Bethesda, Maryland: AABB; 2011.p.801-22.

ANNEXURES

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY

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INSTITUTIONAL ETHICS COMMITTEE

Address of Ethics Committee: The Tamilnadu Dr MGR Medical University Chennai, India	
Presenter: Dr.S.Usha MBBS	
KAB study among Voluntary Blood donors regarding their awareness and willingness to join Stem Cell Registry and to donate Hematopoietic Stem Cells (ECMGR0309045)	
Documents filed	
Protocol	✓
Informed consent documents	✓
Any other documents	HANDOUT QUESTIONNAIRE

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY

No.69, ANNA SALAI, GUINDY, CHENNAI - 600 032.

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INSTITUTIONAL ETHICS COMMITTEE 25.06.15

NAME OF MEMBER	DESIGNATION	SIGNATURE
Prof. D. SHANTHARAM **M.D., D. Diab** VICE CHANCELLOR, THE T.N. DR.MGR MEDICAL UNIVERSITY	**Chairman**	
MR. ANAND DAVID UNIVERSITY STANDING COUNSEL THE T.N. DR.MGR MEDICAL UNIVERSITY	**Member**	
Dr. GEETHALAKSHMI, MD PhD DIRECTOR OF MEDICAL EDUCATION, CHENNAI.	**Member**	—
Dr. PERIANDAVAR MD INSTITUTE OF DIABETOLOGY GOVERNMENT GENERAL HOSPITAL, CHENNAI	**Member**	
DR.SABARATNAVEL, MD DEPARTMENT OF MEDICINE, MADRAS MEDICAL COLLEGE & GOVERNMENT HOSPITAL.	**Member**	
DR. SARAVANAN MDS. DEPT. OF ORAL SURGERY GOVERNMENT DENTAL COLLEGE, CHENNAI	**Member**	—
DR. M. LOGAMANIAN, M.D.,Ph.D. NATIONAL INSTITUTE OF SIDDHA, CHENNAI.	**Member**	25/6/15
Dr. R. P. ILANGHO, M.D DEPT. OF RESPIRATORY MEDICINE, APOLLO HOSPITAL, CHENNAI.	**Member**	
Dr. S. MINI JACOB, M.D DEM, THE T.N. Dr. MGR MEDICAL UNIVERSITY	**Member Secretary**	
DR. N. RAJASEKARAN (ECMGR0309045) DDME	Member representative DME	

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DECISION

Opinion of the institutional Ethics Committee-PLEASE CHECK ONE

✓ Approved

_____ Modification required prior to approval (please specify on the space below)

_____ Disapproved

Date of review: 25.06.15

Signed : _____ (please print name) DR. D. SHANTHARAM M.D., D.Diab
(please delete as appropriate, Chairperson, Secretary)

Modification needed

The research proponent is hereby informed that the Institutional Ethics Committee will require the following:

1) All adverse drug reaction (ADRs) that are both serious and unexpected to be reported promptly to the IEC within 7 working days.

2) The progress report to be submitted to the IEC at least annually.

3) Upon completion of the study, a final study status report to submitted to the IEC.

(ECMGR0309045)

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The Tamil Nadu Dr. M.G.R. Medical University

Department of Transfusion Medicine

Licence No. 191/28C

BLOOD DONOR FORM

DEPT. OF TRANSFUSION MEDICINE
THE TAMIL NADU
Dr. M.G.R. MEDICAL UNIVERSITY

Blood Bag No.	Date			Group & Rh

Personal Particulars

Donor's Name	Age : D.O.B. :	Sex : Male / Female
Residential Address .... Mobile/Ph : ..... Email :	**Office Address** .... Mobile/Ph : ..... Email :	

KIND ATTENTION

Kindly furnish the following information sought on medical grounds as per Government Notification. If any question is felt embarrassing kindly bear with us.

TEMPORARY DEFERRAL, IN THE PAST 12 MONTHS HAVE YOU

- ☞ Received Transfusion of Blood or its products Y/N
- ☞ Suffered from Hepatitis or had Hepatitis Immunoglobulin or had close contact with an individual suffering from Hepatitis Y/N
- ☞ Had exposure to tattoos, acupunture or body piercing? Y/N
- ☞ Had antirabies vaccine or was treated for dog bite? Y/N
- ☞ Undergone any major surgery or met with any major accident? Y/N

IN THE PAST 6 MONTHS HAVE YOU EVER

- ☞ Suffered from Typhoid / Cholera / Acute infection of Kidney or Bladder Y/N
- ☞ Had delivery / had pregnancy / any abortion / or been breast feeding? Y/N / N/A*
- ☞ Had any major surgery or met with any minor accident? Y/N

* N/A - Not applicable

IN THE PAST 3 MONTHS

- ☞ Have you donated blood, plasma or platelets? Y/N
- ☞ Have you been treated for malaria? Y/N

IN THE PAST 2 MONTHS

- ☞ Have you had any history of measles, mumps and chickenpox? Y/N

IN THE PAST 1 MONTH

- ☞ Had treatment for acne with Isotretinoin? Y/N
- ☞ Had Anti tetanus serum, Anti venom serum, Anti diphtheria serum, Anti gas gangrene serum or Rubella Vaccination? Y/N

IN THE PAST 3 WEEKS

- ☞ Have you had tooth extraction or any dental procedure? Y/N

IN THE PAST 2 WEEKS

- ☞ Have you had chicken pox, shingles, measles, mumps or yellow fever vaccination? Y/N

IN THE PAST 1 WEEK

- ☞ Have you had cortisone for treatment? Y/N
- ☞ Had history of diarrhea with fever? Y/N

IN THE PAST 4 DAYS

- ☞ Have you had IV antibiotics? Y/N

IN THE PAST 3 DAYS

- ☞ Have you had oral antibiotics? Y/N

IN THE PAST 24 hours

- ☞ Have you had alcoholic drinks? Y/N
- ☞ Are you an aircrew, a heavy machine vehicle driver, a construction worker? Y/N
- ☞ Are you reporting for duty in the next 12 hours? Y/N
- ☞ Are you suffering from cold, cough, sorethroat or acute sinusitis? Y/N

PERMANENT DEFERRAL

H/o. Uncontrolled blood pressure or stroke? Y/N

H/o. Heart disease or arrhythmias? Y/N

H/o. Epilepsy or anticonvulsants? Y/N

H/o. Auto immune disease or immunosuppressive therapy? Y/N

H/o. Abnormal bleeding tendencies? Y/N

H/o. Diabetes mellitus on treatment with insulin or hypoglycemic drugs? Y/N

H/o. Chronic liver disease or endocrine disorders? Y/N

H/o. Parkinsons diseases? Y/N

H/o. Psoriasis or treatment for the same? Y/N

H/o. Psychiatric disorders? Y/N

H/o. Major surgeries for kidney, heart, liver or brain? Y/N

H/o. Severe allergic disorders or asthmatic on steroid therapy? Y/N

H/o. IV drug abuse, heterosexual/homosexual promiscuity / STD? Y/N

GENERAL QUESTIONS

1. Have you donated blood? Y/N
2. When was your last blood donation? ..... Y/N

   How many times have you donated? ..... Y/N
3. Are you willing to donate for emergency situations? Y/N
4. Have you had any reactions like giddiness/fainting attacks/fits after donation? Y/N
5. Any history of unexplained weight loss / chronic cough / fever / diarrhoea / Lymph nodes enlargement? Y/N

DECLARATION

I hereby declare that the above information is true to the best of my knowledge and this consent of mine to be a blood donor is voluntary. I understood that certain tests (HIV, HCV, HBV, SYPHILIS, MALARIA), will be performed on my blood for the purpose of ensuring the safety.

I would like to know the results, if any positive. Y / N

Date :

Signature of donor

PHYSICAL EXAMINATION

Wt. (in Kg)	HB gm %	PR	BP	RR	TEMP.	CVS	RS	CNS	ABD	Skin disease at phlebotomy site

The above donor is FIT / UNFIT to donate blood.

Blood Bag : SINGLE / DOUBLE / TRIPLE /QUADRUPLE

Volume : 350 ml / 450 ml

Remarks :

Signature of the MEDICAL OFFICER

தமிழ்நாடு டாக்டர் எம்.ஜி.ஆர் மருத்துவப் பல்கலைக்கழகம்

குருதியேற்றுத் துறை

உரிமம் எண். 191/28C

தமிழ்நாடு டாக்டர் எம்.ஜி.ஆர்
மருத்துவப் பல்கலைக்கழகம்

இரத்ததானப்படிவம்

இரத்தப்பை எண்	தேதி	இரத்தகொடையாளர் எண்	இரத்த பிரிவு

தனிப்பட்ட விவரங்கள்

இரத்தக் கொடையாளர் பெயர்	வயது : பிறந்த தேதி :	பாலினம் : ஆண் / பெண்
வீட்டு விலாசம் : ..... போன் : ..... இ-மெயில் :	அலுவலக விலாசம் : ..... போன் : ..... இ-மெயில் :	

தங்கள் கவனத்திற்கு

அரசு விதிகளின்படி மருத்துவரீதியாக கேட்கப்பட்டுள்ள கீழ்க்கண்ட வினாக்களுக்கு விடையளிக்கவும். ஏதேனும் வினாக்கள் தங்களை மனரீதியாக புண்படுத்தியிருந்தால் தயவுகூர்ந்து பொறுத்துக்கொள்ளவும்.

கடந்த பன்னிரெண்டு மாத காலத்திற்குள்

1. இரத்தம் மற்றும் இரத்தக்கூறுகள் தங்களுக்கு ஏற்றப்பட்டுள்ளதா ? — ஆம் – இல்லை
2. மஞ்சள் காமாலை நோயினால் பாதிக்கப்பட்டுள்ளீர்களா ? இம்மியுனோகுளோபின் தடுப்பூசி போட்டுக் கொண்டுள்ளீர்களா ? (அ) மஞ்சள் காமாலை நோயினால் பாதிக்கப்பட்டிருந்த எவரிடமாவது நெருங்கிய தொடர்பு வைத்திருந்தீர்களா ? — ஆம் – இல்லை
3. உடம்பில் (காது மற்றும் ஏதேனும் உடற்பகுதியில்) பச்சை குத்தி உள்ளீர்களா ? — ஆம் – இல்லை
4. நாய்க்கடிக்கான தடுப்பூசி போட்டுள்ளீர்களா ? (அ) நாய்க்கடிக்காக ஏதேனும் சிகிச்சை எடுத்துள்ளீர்களா ? — ஆம் – இல்லை
5. பெரிய அறுவை சிகிச்சை ஏதேனும் செய்து கொண்டுள்ளீர்களா ? (அ) பெரிய விபத்து ஏதேனும் சந்திக்க நேரிட்டதா ? — ஆம் – இல்லை

கடந்த ஆறு மாதகாலத்திற்குள்

1. டைப்பாய்டு, காலரா, சிறுநீரக மற்றும் சிறுநீர்ப்பை (கிருமி) நோய்களால் பாதிக்கப்பட்டுள்ளீர்களா ? — ஆம் – இல்லை
2. சிறிய அறுவை சிகிச்சை ஏதேனும் செய்துகொண்டுள்ளீர்களா ? (அ) சிறிய விபத்து ஏதேனும் சந்திக்க நேரிட்டதா ? — ஆம் – இல்லை

3. மகப்பேறு நடந்துள்ளதா ? தாய்மை அடைந்துள்ளீர்களா ? கருச்சிதைவு ஏற்பட்டுள்ளதா ? தாய்ப்பால் கொடுத்துக் கொண்டிருக்கிறீர்களா ? ஆம் – இல்லை

கடந்த மூன்று மாத காலத்திற்குள்

1. இரத்தம் மற்றும் இரத்தக் கூறுகள் தானம் செய்துள்ளீர்களா ? ஆம் – இல்லை
2. மலேரியா நோய்க்கு சிகிச்சை எடுத்துள்ளீர்களா ? ஆம் – இல்லை

கடந்த இரண்டு மாத காலத்திற்குள்

1. தட்டம்மை, பொன்னுக்கு வீங்கி, அம்மை போன்ற ஏதாவது நோய்களால் பாதிக்கப்பட்டுள்ளீர்களா ? ஆம் – இல்லை

கடந்த ஒரு மாத காலத்திற்குள்

1. முகப்பருக்காக ஐஸோடிரட்டினாயின் போன்ற ஏதேனும் மருந்தை உபயோகப்படுத்தி உள்ளீர்களா ? ஆம் – இல்லை
2. நோய் எதிர்ப்பு சக்தி ஊசி (அ) தடுப்பு ஊசி (டெட்டனஸ், பாம்புக்கடி, டிப்தீரியா, கேஸ் கேங்கரின், ரூபெல்லா) ஏதேனும் போட்டுள்ளீர்களா ? ஆம் – இல்லை

கடந்த மூன்று வார காலத்திற்குள்

1. பல் சிகிச்சை ஏதேனும் செய்து கொண்டுள்ளீர்களா ? ஆம் – இல்லை

கடந்த இரண்டு வார காலத்திற்குள்

1. அம்மை / அக்கி / தட்டம்மை / பொன்னுக்கி வீங்கி / (எல்லோ) காய்ச்சல் போன்ற நோய்களுக்கு தங்களுக்கு தடுப்பூசி ஏதேனும் போடப்பட்டுள்ளதா ? ஆம் – இல்லை

கடந்த ஒரு வார காலத்திற்குள்

1. காய்ச்சலுடன் கூடிய வயிற்றுப்போக்கு ஏற்பட்டுள்ளதா ? ஆம் – இல்லை
2. (ஸ்டீராய்டு) கார்ட்டிஸோன் மாத்திரை எடுத்துள்ளீர்களா ? ஆம் – இல்லை

கடந்த நான்கு நாட்களுக்குள்

1. நரம்பு வழியாக ஏதேனும் ஆண்ட்டிபயாட்டிக் மருந்து எடுத்துள்ளீர்களா ? ஆம் – இல்லை

கடந்த மூன்று நாட்களுக்குள்

1. வாய் வழியாக ஏதேனும் ஆண்ட்டிபயாடிக் மருந்து எடுத்துள்ளீர்களா ? ஆம் – இல்லை

கடந்த 24 மணி நேரத்திற்குள்

1. மது அருந்தி உள்ளீர்களா ? ஆம் – இல்லை
2. தாங்கள் வான்ஊர்தி (அ) கனரக வாகனங்களின் ஓட்டுநர்களா ? ஆம் – இல்லை
3. கட்டுமானப் பணி செய்பவர்களா ? ஆம் – இல்லை
4. அடுத்த 12 மணி நேரத்திற்குள் தாங்கள் தங்கள் பணியில் ஈடுபட வேண்டியுள்ளதா ? ஆம் – இல்லை
5. காய்ச்சல், சளி, இருமல், தொண்டைப்புண், சைனஸ் போன்றவைகளினால் அவதியுறுகிறீர்களா ? ஆம் – இல்லை

பொதுவான சில வினாக்கள்

1. இரத்த தானம் செய்துள்ளீர்களா ? ஆம் – இல்லை
   அவ்வாறெனில் எப்பொழுது..... எத்தனை முறை.....
2. தாங்கள் உணவு அருந்திய நேரம்.....

3. அவசரக் காலங்களில் இரத்த தானம் செய்ய விருப்பம் கொண்டுள்ளீர்களா ? ஆம் – இல்லை

4. இரத்த தானத்தின் போது மயக்கம் அடைந்துள்ளீர்களா ? வலிப்பு ஏற்பட்டுள்ளதா?
(அ) உடல் சம்பந்தமான உபாதைகள் ஏதேனும் ஏற்பட்டதா ? ஆம் – இல்லை

5. காரணம் இல்லாமல் எடை குறைவு, தொடர் இருமல், காய்ச்சல், பேதி, உடற்பகுதியில் ஏதேனும் வீக்கம் (அ) ஊசியினால் காயம் போன்றவைகள் ஏற்பட்டுள்ளதா ? ஆம் – இல்லை

நிரந்தரமாக நிராகரித்தல்

1. கட்டுப்படுத்த இயலாத இரத்த அழுத்தம் (அ) பக்கவாதம் போன்ற நோய்களிலினால் பாதிக்கப்பட்டுள்ளீர்களா ? ஆம் – இல்லை

2. இருதய நோயினால் பாதிக்கப்பட்டுள்ளீர்களா ? ஆம் – இல்லை

3. வலிப்பு நோயினால் பாதிக்கப்பட்டுள்ளீர்களா ? அவ்வாறெனில் அதற்கான சிகிச்சை எடுத்துக்கொண்டிருக்கிறீர்களா ? ஆம் – இல்லை

4. எதிர்ப்புத்திறன் சம்பந்தமான நோய்களால் பாதிக்கப்பட்டுள்ளீர்களா ? எதிர்ப்புத்திறன் குறைக்கும் மருந்துகள் ஏதேனும் எடுததுக்கொண்டிருக்கிறீர்களா ? ஆம் – இல்லை

5. இயல்புக்கு மாறான இரத்தக்கசிவு ஏதேனும் ஏற்பட்டுள்ளதா ?

6. சர்க்கரை நோய்க்காக இன்சுலின் ஊசி (அ) அதற்காக மாத்திரை ஏதேனும் எடுத்துக்கொண்டிருக்கிறீர்களா ? ஆம் – இல்லை

7. கல்லீரல் நோய் உள்ளதா ? நாளமில்லாச் சுரப்பி குறைப்பாடு ஏதேனும் உள்ளதா ? ஆம் – இல்லை

8. பார்க்கின்சன்ஸ் (நடுக்கம்) நோயினால் பாதிக்கப்பட்டுள்ளீர்களா ? ஆம் – இல்லை

9. சோரியாஸிஸ் (தோல்) நோயினால் பாதிக்கப்பட்டு சிகிச்சை எடுத்துக்கொண்டிருக்கிறீர்களா ? ஆம் – இல்லை

10. மனநலம் பாதிக்கப்பட்டுள்ளதா ? ஆம் – இல்லை

11. சிறுநீரகம், இருதயம், கல்லீரல் மற்றும் மூளை போன்ற பகுதிகளில் பெரிய அறுவை சிகிச்சை ஏதேனும் செய்து கொண்டுள்ளீர்களா ? ஆம் – இல்லை

12. ஒவ்வாமை, ஆஸ்துமா போன்ற நோய்களுக்கு ஸ்டீராய்டு சிகிச்சை எடுத்துக் கொண்டிருக்கிறீர்களா ? ஆம் – இல்லை

13. நரம்பு வழி போதை மருந்து பழக்கம், தகாத உடலுறவுப் பழக்கம், பால்வினை நோய்கள் போன்றவைகள் ஏதேனம் உள்ளதா ? ஆம் – இல்லை

உறுதிமொழி

என்னால் அளிக்கப்பட்டுள்ள அனைத்து தகவல்களும் உண்மை எனவும், எனது விருப்பத்தின் பேரில் இரத்ததானம் வழங்குவதற்கு சம்மதம் எனவும் உறுதி அளிக்கின்றேன். பாதுகாப்பு கருதி எனது இரத்தமானது (எச்.ஐ.வி., எச்.சி.வி., எச்.பி.வி., சிபிலிஸ், மலேரியா) போன்ற நோய்களால் பாதிக்கப்பட்டுள்ளதா என்பதைக் கண்டறிய பரிசோதனைகளுக்கு உட்படுத்தப்படும் என்பதை அறிவேன்.

மேற்கூறிய பரிசோதனைகளின் முடிவுகளைத் தெரிந்து கொள்ள விரும்புகிறேன். ஆம் – இல்லை

தேதி :

கொடையாளர் கையொப்பம்

PHYSICAL EXAMINATION

Wt. (in Kg)	HB gm %	PR	BP	RR	TEMP.	CVS	RS	CNS	ABD	Skin disease at phlebotomy site

The above donor is FIT / UNFIT to donate blood.

Blood Bag : SINGLE / DOUBLE / TRIPLE /QUADRUPLE

Volume : 350 ml / 450 ml

Remarks :

Signature of the MEDICAL OFFICER

DONOR INFORMATION SHEET

KAB STUDY AMONG VOLUNTARY BLOOD DONORS REGARDING THEIR AWARENESS AND WILLINGNESS TO JOIN STEM CELL REGISTRY AND TO DONATE HEMATOPOIETIC STEM CELLS

Many diseases like blood & bone marrow cancers, thalassemia are treated by transplanting stem cells which are capable of forming normal blood cells. These cells can be donated to patients by others if found suitable. If donors are not available within family members, donors have to be searched from unrelated sources.

AIM:

To study the knowledge, attitude and behaviour of voluntary blood donors regarding their awareness and willingness to join stem cell registry and to donate hematopoietic stem cells.

PROCEDURE:

Being a voluntary blood donor, you are recruited for this study. A questionnaire will be filled by me as per your response to questions regarding the hematopoietic stem cell donation and stem cell registry, before and after giving you a handout containing information about the same.

BENEFITS AND RISKS

There is no risk to donors enrolled in this study as this is a KAB study and their blood donation process is not interfered with.

CONFIDENTIALITY

Your privacy will be protected in so far as permitted by law. Only your researcher and Ethical committee members will have access to the data collected during the study.

PARTICIPATION

Your participation in this study is voluntary and you are free to decide now or later whether to continue or discontinue from the study.

NAME OF THE DONOR:

SIGNATURE :

DATE :

CONSENT

I confirm that I have read and understood the information about the above research study dated _____ and I received chance to ask the questions.

My participation in this study is voluntary and I know that I am free to withdraw from the study at any time, without giving any reason and without affecting of my legal rights.

I agree to this access. I know that my identification will not be revealed in any details that is released to third persons or published.

I agree not to restrict or interfere any data or results that are obtained from this study.
I agree to participate in this research study for the above listed purpose.

Donor's name :

Signature : Date:

Signature of the person
who obtains consent :

Donor ID number : Date:

பங்கேற்பாளருக்கான தகவல் படிவம்:

குறிகொள்:

இந்த ஆராய்ச்சி தன்னார்வ இரத்தக் கொடையாளர்களின் விழிப்புணர்வு மற்றும் ஸ்டெம் செல் பதிவேட்டில் சேர்ந்து எலும்பு மஜ்ஜை ஸ்டெம் செல்களை தானம் செய்வது பற்றியது. இதை பற்றி அவர்களின் அறிவு, அணுகுமுறை மற்றும் நடத்தையை இவ்வாராய்ச்சி ஆய்வு செய்கிறது.

செய்முறை:

இரத்தக் கொடையாளர்களிடம், எலும்பு மஜ்ஜை ஸ்டெம் செல் தானம் மற்றும் செல் பதிவேடு பற்றிய தகவல் கொடுக்கும் முன்னரும் பின்னரும் கேள்விகள் கேட்கப்படும்.

பலன்களும் பாதிப்புகளும்:

இந்த ஆராய்ச்சி அறிவு, அணுகுமுறை மற்றும் நடத்தை பற்றியது. இரத்ததான்ததில் குறுக்கிடுவதில்லை. அதனால் இரத்த கொடையாளர்களுக்கு எவ்வித பாதிப்பும் இல்லை.

ரகசிய பாதுகாப்பு:

சட்ட வரைமுறையின்படி தங்களின் சொந்த விஷயங்கள் பாதுகாக்கபடும். தங்களின் ஆராய்ச்சியாளர் மட்டும் இந்த ஆராய்ச்சியின்போது கிடைக்கும் புள்ளி விவரங்களை பயன்படுத்த இயலும்.

பங்களிப்பு:

இந்த ஆராய்ச்சியில் தங்களின் பங்களிப்பு தன்னார்வமானது. இந்த ஆராய்ச்சியில் தங்களின் பங்கேற்பிளை தொடர்வதற்க்கும் விடுபடுவதர்க்கும் என்த நேரமும் தங்களுக்கு உரிமை உண்டு.

கொடையாளரின் பெயர் :

கையொப்பம் :

தேதி :

ஒப்புதல்:

மேற்கண்ட ஆராய்ச்சியினைப் பற்றிய தகவல்களைப் படித்து புரிந்து கொண்டேன் என்பதையும் வினாக்களைக் கேட்பதற்கான வாய்ப்பும் எனக்கு அளிக்கப்பட்டது என்பதை நான் உறுதி செய்கிறேன்.

இந்த ஆராய்ச்சியில் எனது பங்கு சொந்த விருப்பத்தின் பேரில் மட்டுமே, சட்ட ரீதியான எனது உரிமைகள்பாதிக்கபடாமலும் எந்த நேரத்திலும் இந்த ஆராய்ச்சியிலிருந்து என்னை விடவித்துக் கொள்ள முடியும் என்பதை நான் அறிவேன்.

எனது தனிப்பட்ட விஷயங்கள் மூன்றாவது பேருக்கோ அல்லது எந்த பிரசாரத்திற்கும் வெளியிடப்படமாட்டாது என்பதை நான் அறிவேன்.

இந்த ஆராய்ச்சியின் முடிவுகள மற்றும் புள்ளி விவரங்கள் போன்றவற்றை தடை செய்யவும் மாட்டேன் குறுக்கிடவும மாட்டேன் எனபதை ஒத்துக்கொள்கிறேன்.

மேற்கூறிய நோக்கத்திற்காக இந்த ஆராய்ச்சியில் பங்கெடுத்துக் கொள்ள நான் ஒத்துக்கொள்கிறேன்.

கொடையாளரின் பெயர் / கையொப்பம்: உறுதி மொழி பெறுபவரின் கையொப்பம்:

தேதி:

Questionnaire

Questionnaire No.	:	Date	:
Donor Registration No.	:	Camp site/walkin	:
Age (Completed)	:	Education (completed)	:
Gender	: male / female		
Marital status	: unmarried/married		

PART ONE:

1. Have you donated blood before?

   a) Yes (__ times) b) No

2. Have you donated blood components by apheresis?

   a) Yes b) No

3. Have you heard about marrow stem cell donation?

   a) Yes b) No (Go to Q.no.9)

4. i) Do you know for what purpose marrow stem cells are donated?

   a) Yes b) No (Go to Q.No.5)

   ii) Is there any person known to you who needs/has needed marrow stem cells as treatment?

   a) Yes (related / unrelated person) b) No

5. Do you know about the risks involved in marrow stem cell donation procedure?

   a) Yes b) No

6. Do you know what important test is done before marrow stem cells are donated?

   a) Yes b) No

7. Have you heard about registry for unrelated adult marrow stem cell donors?

   a) Yes b) No (Go to Q.No.9)

8. Have you registered at such a registry?

   a) Yes b) No

9. Are you willing to donate marrow stem cells?

   a) Yes b) No c) Not sure

PART TWO:

10 Are you willing to donate marrow stem cells?

a) Yes b) No (Go to Q.No.12) c) Not sure (Go to Q.No.12)

11. i) If yes, to whom?

a) FAMILY MEMBERS b) KNOWN UNRELATED PERSONS c) ANYONE IN NEED

ii) If given an opportunity, are you willing to join stem cell registry and donate marrow stem cells to an unrelated person?

a) Yes b) No

iii) If yes, are you willing to donate more than once if necessary?

a) Yes b) No c) Not sure

iv) Are you willing to donate blood or its components, if needed, for the same patient?

a) Yes b) No c) Not Sure (Go to Q.No.13)

12. If no or not sure about willingness to donate, give reasons:

13. i) Do you think other's opinion may make you change your decision?

a) Yes b) No

ii) If yes, whose opinion?

a) PARENTS b) SIBLING c) SPOUSE d) FRIENDS

e) ANY OTHER PERSON f) PERSON WHO HAS ALREADY DONATED

HANDOUT

- **What are marrow stem cells?**

  - Cells which form red blood cells, white blood cells & platelets.

  - They are present in bone marrow, blood (after giving some drugs), umbilical cord blood.

- **Marrow stem cell transplantation**

  - It is a potentially life-saving treatment for children & adults with various blood & bone marrow cancers, haemoglobin-disorders, metabolic & immunity-related diseases.

  - Sometimes, it is the only treatment available without which they may die.

- **What is HLA?**

  - Substance present on the surface of cells called Human leucocyte Antigen.

  - HLA should match closely between donor & patient cells for success of transplantation but this is not as simple as blood group matching.

- **Marrow stem cell donation**

  - Is voluntary

  - Donors should be healthy & free from risk of transmittable diseases.

  - Donors are tested for HLA, blood group, infections.

  - Donors will not be paid for donation

- **Two ways of collection from adult donor:**

  1. From blood:

  - Drug "G-CSF" is injected just below skin, once daily for 5 days; then stem cells are collected from peripheral vein by apheresis.

  - Common side-effects are bone pain, headache, muscle pain, tiredness from which donors will recover within few days or by taking medicines.

2. Directly from bone marrow

- Under general or spinal anaesthesia, stem cells are collected from hipbone using special needle.
- Common side-effects are tiredness, pain at collection site, back pain, nausea, headache from which donors will recover by taking medicines & rest for few days.

- **Stem Cell Registry**
  - Adults, who are voluntarily willing to donate marrow stem cells to any unrelated patient, anywhere in the world, can join registry.
  - Minimum age for joining is 18 years; maximum age is as per registry policy.
  - Registry will store details of donor HLA test in their software.
  - Only if donor's HLA matches with a patient's HLA, registry will contact donor.
  - Identity of both the patient & donor will not be revealed to each other.
  - Donor may be asked to donate stem cells again or to donate blood for the same patient if needed.
  - Donor has the right to withdraw ANYTIME from the registry.

- **Need for more unrelated adult HSC donors in India**
  - 70% of patients do not have donors within their family.
  - They have to rely on unrelated adult donors or public umbilical cord blood for marrow stem cells.
  - There are only 3 public umbilical cord blood banks in India.
  - Only about one lakh adults have registered as potential unrelated donors into the available registries in the country.
  - If patients don't find donors within them, they will have to search in foreign registries which is very costly& time-consuming with practical difficulties.

- "மாரோ" (Marrow) ஸ்டெம் செல்கள் என்றால் என்ன?

"மாரோ" (Marrow) என்றால் எலும்பு மஜ்ஜை.
அனைத்து இரத்த அணுக்களும் இந்த ஸ்டெம் செல்களிருந்து தோன்றுகிறது. இந்த ஸ்டெம் செல்கள் எலும்பு மஜ்ஜை, தொப்புள் கொடி இரத்தம் மற்றும் சில மருந்துகள் கொடுத்த பின் இரத்தத்திலும் காணப்படுகிறது.

- எலும்பு மஜ்ஜை ஸ்டெம் செல்கள் மறுநடவு.

- இது பல்வேறு இரத்த மற்றும் எலும்பு மஜ்ஜை புற்றுநோய், ஹீமோகுளோபினின் - ஒழுங்கின்மைகள், வளர்சிதை மற்றும் நோய் - எதிர்ப்பு சக்தி தொடர்பான நோய்கள் குழந்தைகள் மற்றும் பெரியவர்களுக்கு ஒரு முக்கியமான உயிர் காக்கும் சிகிச்சை ஆகும்.
- சில நேரங்களில் இது மட்டும் உயிர்காக்கும் சிகிச்சையாக அமைகிறது.

- "எச்.எல்.ஏ" என்றால் என்ன?

- இவை அணுக்களின் மேற்பரப்பில் காணப்படும்.
இச்சிகிச்சை வெற்றிபெற வேண்டுமெனில், ஸ்டெம் செல் தானம் செய்பவர் மற்றும் பெறுபவர்களுக்கு எச்.எல்.ஏ பொருந்த வேண்டும்.

- எலும்பு மஜ்ஜை ஸ்டெம் செல்கள் தானம்

- தன்னார்வ தானம்
- தானம் செய்பவர் நல்ல ஆரோக்கியத்துடன் இருக்க வேண்டும்.
- தானம் செய்பவர்க்கு எச்.எல்.ஏ, இரத்தவகை, தொற்று நோய் பரிசோதனை செய்யப்படும்
- தானம் செய்பவர்க்கு கைமாறு ஏதும் தரப்படமாட்டாது.

• கொடையாளர்களிடம் இருந்து இரண்டு முறையில் ஸ்டெம் செல்களை பெறலாம்

1. இரத்தத்தில் இருந்து : தோலின் கீழ் "G-CSF" (ஜீ-சி.எஸ்.எப்) என்னும் மருந்து, உடலிலும் 5 நாட்களுக்கு தினம் ஒரு முறை செலுத்திய பின் ஸ்டெம் செல்கள் இரத்தத்திலிருந்து பிரிக்கப்படும். இதனால் எலும்புவலி தலைவலி, தசைவலி, சோர்வு எனும் பக்க விளைவுகள் ஏற்படலாம். ஆனால் சில நாட்களில் தன்னால் அல்லது மருந்து சாப்பிட்டோ இப்பக்க விளைவுகளிலிருந்து விடுபடுவார்கள்.

2. மஜ்ஜையில் இருந்து : மயக்க மருந்து செலுத்தி சிறப்பு உளி பயன்படுத்தி ஸ்டெம் செல்கள் இடுப்பு எலும்பிலிருந்து சேகரிக்கப்படும். இதனால் சோர்வு, உளி போட்ட இடத்தில் வலி, பின்முதுகு வலி, தூக்கமின்மை, தலைவலி எனும் பக்க விளைவுகள் ஏற்படலாம்; இவ்வு மற்றும் மருந்து எடுத்துக்கொண்டால் இப்பக்க விளைவுகளிலிருந்து கொடையாளிகள் விடுபடுவார்கள்.

• ஸ்டெம் செல் பதிவேடு :

- எலும்பு ஸ்டெம் செல்தானை உலகத்தின் எந்த நோயாளிக்கும் தானமாக கொடுக்க விருப்பம் உள்ளவர்கள் இப்பதிவேட்டில் சேரலாம்
- தானம் செய்பவர்களின் குறைந்த பட்ச வயது 18
- அதிகபட்ச வயது பதிவேட்டின் கொள்கைகளின் படி நிர்ணயிக்கப்படும்.
- தானம் செய்பவரின் எச்.எல்.ஏ சோதனையைப் பற்றிய விவரங்களை பதிவேட்டின் மென்பொருள் மூலம் சேமிக்கப்படு
- கொடையாளியின் எச்.எல்.ஏ மற்றும் நோயாளியின் எச்.எல்.ஏ பொருந்தினால் மட்டுமே கொடையாளி அழைக்கப்படுவார்.

- நோயாளியின் விவரங்கள் கொடையாளிக்கோ அல்லது கொடையாளியின் விவரங்கள் நோயாளிக்கோ தெரிவிக்கப் பட மாட்டாது.
- தேவையெனில் நோயாளிக்கு மறுபடியும் ஸ்டெம் செல்களோ அல்லது இரத்தமோ தேவைப்படலாம். அதனால் கொடையாளி திரும்பவும் அழைக்கப்படலாம்.
- எந்த நேரத்திலும் விலகிக்கொள்ள கொடையாளிக்கு உரிமை உண்டு

• உறவினர் அல்லாத ஸ்டெம் செல் கொடையாளர்கள் இந்தியாவில் தேவை

- 70% நோயாளிகளுக்கு தங்கள் குடும்பத்திற்குள்ளிருந்தே கொடையாளிகள் கிடைப்பதில்லை.
- அதனால் தொப்புள்கொடி இரத்த வங்கி அல்லது உறவினர் அல்லாத கொடையாளிகளை ~~Eww~~ சார்ந்துள்ளனர்
- இந்தியாவில் மொத்தம் 3 பொது தொப்புள்கொடி இரத்த வங்கிகளே உள்ளன.
- நமது நாட்டிலுள்ள பதிவேடுகளில் உறவினர் அல்லாத கொடையாளர்கள் ஒரு லட்சம் பேர் மட்டுமே பதிவு செய்துள்ளனர்
- இப்படிப்பட்ட நோயாளிகளுக்கு இந்தியாவிலேயே கொடையாளர்கள் கிடைக்குமில்லை எனில் வெளிநாட்டு பதிவேடுகளின் தேடுவது பணவிரயம், நேர விரயம் மற்றும் நடைமுறை சிக்கல்களை கொண்டது.

MASTER CHART

QNO	AGE	GENDER	MARSTAT	EDU	PASTDON	NUMDON	APHER	HRDMSD	PURPOSE	NEEDMSD	RISK	TESTREQD	HRDRGSRY	SCORE	KLEVEL	ENROLLD	WILLNG	WLLNGNOW	WHONOW	JOINNOW	RPTNOW	BLDALSO	REASON	OPINION	WHOSEOPN
1	24	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	1	0
2	23	0	0	6	1	5	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
3	32	0	1	6	1	10	0	1	0	999	0	0	0	1	0	999	2	2	999	999	999	999	0	1	7
4	24	0	0	6	1	2	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	0
5	28	1	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
6	23	0	0	6	1	7	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	1	0
7	39	0	1	6	1	10	0	1	0	999	0	0	1	2	0	0	2	1	2	1	1	1	999	1	3
8	29	0	1	4	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
9	24	0	1	4	0	999	0	0	999	999	999	999	999	0	0	999	0	2	999	999	999	999	0	1	2
10	57	0	1	6	1	10	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	1	6
11	22	0	0	6	1	6	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
12	37	0	1	6	1	20	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
13	55	0	1	6	1	130	1	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
14	41	0	1	6	1	7	0	1	0	999	0	0	0	1	0	999	2	2	999	999	999	999	3	0	999
15	39	0	1	3	1	6	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	4	1	7
16	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	1	1	0	0	999	999	999	1	0
17	21	0	0	5	1	3	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	0	1	0
18	20	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	1	0
19	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
20	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	1	0	2	999	999	999	0	999
21	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	6
22	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
23	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	1	2	1	1	1	999	0	999
24	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	1	0
25	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	0	1	0
26	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	3	1	0
27	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
28	21	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
29	20	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	1	0
30	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
31	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	0	1	0
32	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
33	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	6	0	999
34	19	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	1	1	3	2	999	999	999	1	0
35	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	1	1	0	2	999	999	999	0	999
36	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
37	18	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
38	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	2	1	0
39	19	0	0	5	0	999	0	1	1	0	0	0	0	2	0	999	2	1	2	1	2	1	999	0	999
40	18	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
41	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
42	19	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	1	1	2	1	0	1	999	1	0
43	18	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	1	0	999
44	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	0	1	0
45	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	0
46	20	0	0	5	1	1	0	1	1	0	0	0	0	2	0	999	0	0	999	999	999	999	1	1	0
47	23	0	0	6	0	999	0	1	1	0	0	0	0	2	0	999	2	2	999	999	999	999	3	1	8
48	25	0	1	5	1	3	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	1	6
49	37	0	1	6	1	2	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
50	27	0	0	6	1	4	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	9	0	999
51	22	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	9	0	999
52	22	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
53	22	0	0	4	0	999	0	0	999	999	999	999	999	0	0	999	0	1	0	2	999	999	999	0	999

QNO	AGE	GENDER	MARSTAT	EDU	PASTDON	NUMDON	APHER	HRDMSD	PURPOSE	NEEDMSD	RISK	TESTREQD	HRDRGSRY	SCORE	KLEVEL	ENROLLD	WILLNG	WLLNGNOW	WHONOW	JOINNOW	RPTNOW	BLDALSO	REASON	OPINION	WHOSEOPN
54	21	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
55	19	0	0	5	0	999	0	1	0	999	0	0	0	1	0	999	1	1	2	1	0	1	999	0	999
56	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
57	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	1	1	0
58	19	0	0	5	0	999	0	1	0	999	0	0	0	1	0	999	2	2	999	999	999	999	0	1	0
59	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
60	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	0	1	999	0	999
61	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	0	1	999	0	999
62	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	1	5
63	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	0
64	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	7	0	999
65	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
66	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	0
67	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	0	1	999	0	999
68	19	0	0	5	0	999	0	1	0	999	0	0	0	1	0	999	2	1	2	1	0	1	999	1	0
69	20	0	0	5	0	999	0	1	1	0	0	0	0	2	0	999	0	1	3	0	999	999	999	0	999
70	22	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
71	21	0	0	5	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
72	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	1	1	0
73	18	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
74	25	0	1	6	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	1	5
75	35	0	1	6	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	1	5
76	30	0	1	6	1	6	0	1	0	999	0	0	0	1	0	999	1	1	2	1	1	1	999	0	999
77	25	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
78	24	0	0	4	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	1	5
79	24	0	0	4	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	2	999	1	5
80	23	0	0	4	1	5	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
81	30	0	1	5	1	3	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
82	29	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	6	0	999
83	27	0	0	4	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
84	40	0	1	5	1	5	0	1	0	999	0	0	0	1	0	999	0	2	999	999	999	999	13	0	999
85	45	0	1	5	1	17	0	0	999	999	999	999	999	0	0	999	2	1	2	1	0	1	999	0	999
86	24	0	0	6	1	2	0	1	1	0	0	0	1	3	0	0	1	1	2	1	2	1	999	0	999
87	23	0	0	6	1	2	0	1	1	0	0	0	0	2	0	999	2	1	2	1	1	1	999	1	0
88	34	0	1	3	1	2	0	0	999	999	999	999	999	0	0	999	0	2	999	999	999	999	0	1	2
89	36	0	1	6	1	4	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
90	35	0	1	6	1	7	0	1	1	1	0	0	0	3	0	999	2	2	999	999	999	999	3	1	2
91	22	0	0	6	1	2	0	0	999	999	999	999	999	0	0	999	2	1	2	1	0	1	999	0	999
92	29	0	1	6	1	4	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
93	35	0	1	6	1	6	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
94	33	0	0	6	1	6	0	1	1	0	0	0	0	2	0	999	1	1	0	0	999	999	999	0	999
95	40	0	1	6	1	7	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	9	0	999
96	40	1	1	4	1	12	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	4	0	999
97	41	0	1	6	0	999	0	1	0	999	0	0	0	1	0	999	1	2	999	999	999	999	0	1	9
98	30	0	1	6	1	15	1	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	2
99	26	1	0	6	1	3	0	1	1	0	0	0	0	2	0	999	1	1	2	1	1	1	999	0	999
100	30	0	1	6	1	7	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	3	0	999
101	25	0	0	6	1	16	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
102	24	0	1	6	1	2	0	1	1	0	0	0	1	3	0	0	1	1	2	1	2	1	999	0	999
103	35	0	1	6	1	3	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	3	0	999
104	20	0	0	6	1	1	0	1	0	999	0	0	0	1	0	999	1	1	2	1	1	1	999	0	999
105	28	0	0	3	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	10	0	999
106	18	0	0	5	0	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	2	0	999
107	35	0	1	4	1	5	0	1	0	999	0	0	0	1	0	999	1	1	2	1	2	1	999	0	999
108	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	0	2	999	999	999	1	0

QNO	AGE	GENDER	MARSTAT	EDU	PASTDON	NUMDON	APHER	HRDMSD	PURPOSE	NEEDMSD	RISK	TESTREQD	HRDRGSRY	SCORE	KLEVEL	ENROLLD	WILLNG	WLLNGNOW	WHONOW	JOINNOW	RPTNOW	BLDALSO	REASON	OPINION	WHOSEOPN
109	20	0	0	4	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	0
110	42	0	1	4	1	4	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
111	30	0	1	3	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
112	22	0	0	3	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
113	28	0	1	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	4	0	999
114	21	0	0	3	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	1	1
115	23	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	1	0
116	27	0	1	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	2
117	29	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
118	30	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
119	31	0	1	6	1	10	0	0	999	999	999	999	999	0	0	999	2	1	0	0	999	999	999	0	999
120	23	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
121	27	0	1	5	1	2	0	0	999	999	999	999	999	0	0	999	2	1	0	0	999	999	999	0	999
122	27	0	0	6	1	8	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	5
123	25	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
124	32	0	1	6	1	4	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
125	27	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
126	37	0	1	4	1	4	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
127	23	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
128	23	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
129	23	0	0	5	1	3	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
130	25	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
131	31	0	1	4	1	2	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
132	24	0	0	4	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	0	1	999	0	999
133	22	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	1	0
134	24	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	4	0	999
135	22	0	0	5	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
136	25	0	1	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	3	0	999
137	23	0	0	6	1	7	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
138	28	0	1	6	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	9
139	25	0	0	5	1	1	0	1	1	1	0	0	0	3	0	999	1	1	2	1	2	1	999	0	999
140	25	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	3	0	999	999	999	0	999
141	24	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
142	31	0	1	5	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	8	0	999
143	35	0	1	6	1	2	0	0	999	999	999	999	999	0	0	999	2	1	0	2	999	999	999	0	999
144	25	0	0	6	1	6	0	0	999	999	999	999	999	0	0	999	2	1	0	0	999	999	999	0	999
145	23	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
146	24	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	4	0	999
147	31	0	1	6	1	1	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	9	0	999
148	45	0	1	4	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
149	24	0	0	6	1	8	0	1	0	999	0	0	0	1	0	999	1	1	2	1	1	1	999	0	999
150	22	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
151	21	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
152	24	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
153	22	0	0	5	0	999	0	1	0	999	0	0	0	1	0	999	1	2	999	999	999	999	3	0	999
154	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
155	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	1	1	0
156	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
157	21	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
158	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	1	0	999
159	21	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
160	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	2	999	999	999	999	0	1	0
161	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	1	2	1	1	1	999	0	999
162	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	0	1	0
163	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	0

QNO	AGE	GENDER	MARSTAT	EDU	PASTDON	NUMDON	APHER	HRDMSD	PURPOSE	NEEDMSD	RISK	TESTREQD	HRDRGSRY	SCORE	KLEVEL	ENROLLD	WILLNG	WLLNGNOW	WHONOW	JOINNOW	RPTNOW	BLDALSO	REASON	OPINION	WHOSEOPN
164	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	2	999	999	999	999	1	0	999
165	19	1	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
166	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	10	1	0
167	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
168	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	2	999	999	999	999	1	0	999
169	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	1	0
170	20	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
171	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	0	2	999	999	999	999	0	1	0
172	21	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
173	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	1	0	999
174	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	1	2	1	1	2	999	0	999
175	19	0	0	5	1	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
176	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	1	2	1	1	1	999	1	0
177	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	1	2	1	2	2	999	1	0
178	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	2	999	0	999
179	20	1	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	1	0
180	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
181	20	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	0	1	2	1	1	1	999	0	999
182	26	0	0	6	1	2	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	1	0	999
183	25	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
184	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
185	21	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	1	0	999
186	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
187	18	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	5
188	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
189	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
190	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
191	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
192	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
193	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
194	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	1	0	999
195	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
196	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
197	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
198	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
199	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
200	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	1	0
201	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	1	0	999
202	19	0	0	5	0	999	0	1	1	0	0	0	0	2	0	999	0	0	999	999	999	999	1	1	0
203	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	1	0
204	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	2	999	0	999
205	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
206	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
207	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	0
208	20	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
209	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	11	0	999
210	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	0
211	20	0	0	5	1	3	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	0
212	18	0	0	5	0	999	0	1	1	1	0	0	0	3	0	999	2	1	2	1	2	1	999	0	999
213	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
214	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
215	20	1	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	0
216	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
217	25	0	0	6	1	1	0	1	1	0	0	0	0	2	0	999	2	2	999	999	999	999	9	0	999
218	24	0	0	6	1	3	0	1	0	999	0	0	0	1	0	999	2	1	2	1	2	1	999	1	5

QNO	AGE	GENDER	MARSTAT	EDU	PASTDON	NUMDON	APHER	HRDMSD	PURPOSE	NEEDMSD	RISK	TESTREQD	HRDRGSRY	SCORE	KLEVEL	ENROLLD	WILLNG	WLLNGNOW	WHONOW	JOINNOW	RPTNOW	BLDALSO	REASON	OPINION	WHOSEOPN
219	21	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
220	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	0
221	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	0
222	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	1	0
223	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
224	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	0
225	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	0	1	0
226	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
227	40	0	1	3	1	6	0	1	0	999	0	0	0	1	0	999	2	2	999	999	999	999	11	0	999
228	20	1	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	0	1	999	1	0
229	48	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	5
230	19	1	0	5	0	999	0	1	1	0	0	0	0	2	0	999	1	1	2	1	0	1	999	1	0
231	42	0	1	6	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	9
232	24	0	0	6	1	2	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	12	1	5
233	31	0	0	3	1	4	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	1	2
234	35	0	1	5	1	1	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
235	31	0	1	4	1	10	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
236	22	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
237	31	0	1	5	1	7	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
238	22	0	1	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	0
239	24	0	0	6	1	2	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
240	23	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
241	20	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	4	1	0
242	20	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	0
243	23	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	5
244	23	0	0	6	1	5	0	0	999	999	999	999	999	0	0	999	0	1	0	0	999	999	999	0	999
245	23	0	0	6	1	5	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
246	30	0	1	5	1	5	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	4	0	999
247	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	7	0	999
248	21	0	0	6	1	2	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	5
249	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
250	25	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	0	999
251	23	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
252	23	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	1	0	999
253	30	0	1	6	1	2	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
254	28	0	0	6	1	8	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
255	18	0	0	5	1	1	0	1	1	0	0	0	0	2	0	999	1	0	999	999	999	999	1	0	999
256	28	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
257	19	0	0	5	1	1	0	1	1	0	1	1	1	5	1	1	1	1	2	1	1	1	999	0	999
258	19	0	0	5	0	999	0	1	1	0	1	1	1	5	1	1	1	1	2	1	2	1	999	0	999
259	20	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
260	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	1	0
261	29	0	0	6	1	5	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
262	24	0	0	6	1	5	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
263	20	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	2	999	0	999
264	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	2	0	999
265	23	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
266	24	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	2	0	999
267	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
268	19	0	0	5	1	1	0	1	1	0	1	1	1	5	1	1	1	1	2	1	1	1	999	0	999
269	24	0	0	6	1	3	1	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
270	24	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
271	20	0	0	6	1	3	0	1	1	1	0	0	1	4	1	0	1	1	2	1	2	1	999	0	999
272	22	0	0	6	1	4	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
273	26	0	0	6	1	6	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999

QNO	AGE	GENDER	MARSTAT	EDU	PASTDON	NUMDON	APHER	HRDMSD	PURPOSE	NEEDMSD	RISK	TESTREQD	HRDRGSRY	SCORE	KLEVEL	ENROLLD	WILLNG	WLLNGNOW	WHONOW	JOINNOW	RPTNOW	BLDALSO	REASON	OPINION	WHOSEOPN
274	24	0	0	6	1	10	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
275	23	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
276	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
277	27	0	0	4	1	2	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
278	26	0	0	4	1	6	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
279	26	0	0	6	1	6	0	1	1	1	0	0	0	3	0	999	1	1	2	1	1	1	999	0	999
280	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	0
281	19	1	0	5	0	999	0	1	0	999	0	0	0	1	0	999	0	2	999	999	999	999	1	1	1
282	20	1	0	5	0	999	0	1	0	999	0	0	0	1	0	999	2	2	999	999	999	999	1	1	0
283	23	1	0	5	0	999	0	1	0	999	0	0	0	1	0	999	0	0	999	999	999	999	2	1	0
284	19	1	0	5	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	3	1	6
285	19	1	0	5	0	999	0	1	1	0	0	0	0	2	0	999	2	2	999	999	999	999	1	0	999
286	19	1	0	5	0	999	0	1	1	0	0	0	0	2	0	999	2	2	999	999	999	999	1	1	0
287	19	1	0	5	0	999	0	1	1	0	0	0	0	2	0	999	2	2	999	999	999	999	1	0	999
288	19	1	0	5	0	999	0	1	1	0	0	0	0	2	0	999	2	2	999	999	999	999	11	1	0
289	21	1	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	0	1	1
290	21	1	0	5	0	999	0	1	0	999	0	0	0	1	0	999	0	1	2	1	1	1	999	0	999
291	26	0	0	6	1	6	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	3	0	999
292	40	1	1	6	1	1	0	1	0	999	0	0	1	2	0	0	1	1	2	1	1	1	999	0	999
293	47	0	1	4	1	1	0	1	0	999	0	0	0	1	0	999	0	0	999	999	999	999	4	0	999
294	32	0	1	6	0	999	0	1	1	1	0	0	0	3	0	999	2	1	2	1	2	2	999	1	2
295	42	0	1	6	1	1	0	1	0	999	0	0	0	1	0	999	0	2	999	999	999	999	0	1	9
296	32	0	1	4	1	6	0	0	999	999	999	999	999	0	0	999	1	1	2	1	0	1	999	0	999
297	38	0	1	4	1	10	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	1	0
298	51	0	1	4	1	2	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	13	0	999
299	38	0	1	4	1	2	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	4	1	3
300	30	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	7	0	999
301	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
302	45	0	1	4	1	5	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
303	39	0	1	3	1	4	0	1	0	999	0	0	0	1	0	999	2	0	999	999	999	999	4	0	999
304	29	0	1	5	1	4	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	1	0	999
305	45	0	1	4	0	999	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	3	1	6
306	24	0	0	6	1	2	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
307	20	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	1	0
308	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	0	1	1
309	21	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
310	21	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
311	40	0	1	4	1	10	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	4	0	999
312	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
313	20	0	0	5	1	1	0	1	0	999	0	0	0	1	0	999	2	1	2	1	2	1	999	1	0
314	23	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
315	22	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
316	26	0	0	2	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	4	0	999
317	24	0	0	6	1	6	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	1	0
318	21	0	0	3	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
319	42	0	1	6	1	2	0	1	0	999	0	0	0	1	0	999	0	0	999	999	999	999	2	0	999
320	30	0	1	4	1	25	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	10	1	9
321	22	0	0	4	1	4	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
322	24	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
323	23	0	0	4	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	4	0	999
324	23	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
325	31	0	1	6	1	1	0	1	0	999	0	0	0	1	0	999	0	0	999	999	999	999	2	0	999
326	21	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
327	24	0	0	6	0	999	0	1	0	999	0	0	0	1	0	999	1	0	999	999	999	999	4	1	0
328	23	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999

QNO	AGE	GENDER	MARSTAT	EDU	PASTDON	NUMDON	APHER	HRDMSD	PURPOSE	NEEDMSD	RISK	TESTREQD	HRDRGSRY	SCORE	KLEVEL	ENROLLD	WILLNG	WLLNGNOW	WHONOW	JOINNOW	RPTNOW	BLDALSO	REASON	OPINION	WHOSEOPN
329	23	0	0	5	1	2	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	1
330	21	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	0	1	0	0	999	999	999	1	6
331	22	0	0	6	1	4	0	1	0	999	0	0	0	1	0	999	1	2	999	999	999	999	9	0	999
332	28	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	1	0
333	26	0	0	4	1	2	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	6
334	22	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	1	1	0
335	22	0	0	3	1	6	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	0	1	0
336	22	0	0	6	1	2	0	1	1	0	0	0	0	2	0	999	1	1	2	1	1	1	999	0	999
337	19	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	1	1	0
338	28	0	0	6	1	10	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
339	20	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	1	0	999	999	999	999	0	1	0
340	24	0	0	6	1	20	1	1	0	999	0	0	0	1	0	999	1	1	2	1	1	1	999	0	999
341	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	2	1	0
342	46	0	1	1	0	999	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
343	19	0	0	5	0	999	0	1	0	999	0	0	0	1	0	999	0	0	999	999	999	999	2	0	999
344	36	0	1	6	1	8	0	1	1	0	0	0	0	2	0	999	0	0	999	999	999	999	1	0	999
345	28	0	1	4	1	1	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
346	27	0	1	5	1	3	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
347	40	0	1	6	0	999	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	4	0	999
348	27	0	0	6	1	10	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	1	0
349	28	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
350	22	0	0	4	1	1	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
351	24	0	0	6	1	7	0	1	1	0	0	1	0	3	0	999	1	1	2	1	1	1	999	0	999
352	31	0	0	6	1	20	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
353	27	0	0	4	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
354	38	0	1	6	1	7	1	1	0	999	0	0	0	1	0	999	1	1	2	1	1	1	999	1	6
355	52	0	1	6	1	38	0	0	999	999	999	999	999	0	0	999	1	1	2	1	0	1	999	0	999
356	45	0	1	6	1	10	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
357	25	0	0	5	1	3	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
358	23	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	1	1	0
359	33	0	1	6	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
360	41	0	1	6	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
361	40	0	1	6	1	5	0	1	1	0	0	0	1	3	0	0	2	2	999	999	999	999	1	1	5
362	39	0	1	6	1	4	0	0	999	999	999	999	999	0	0	999	1	1	2	1	1	1	999	0	999
363	35	0	1	6	1	1	0	0	999	999	999	999	999	0	0	999	0	2	999	999	999	999	0	1	1
364	34	0	1	6	1	25	0	1	1	0	0	0	0	2	0	999	2	0	999	999	999	999	2	0	999
365	28	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
366	47	0	1	6	1	15	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	11	0	999
367	26	0	0	6	1	15	0	0	999	999	999	999	999	0	0	999	2	1	3	0	999	999	999	0	999
368	36	0	1	6	1	4	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
369	37	0	1	6	1	26	1	1	0	999	0	0	0	1	0	999	2	1	2	1	1	1	999	1	6
370	32	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
371	49	0	1	6	1	15	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
372	26	0	0	6	1	5	1	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
373	23	1	0	6	1	5	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	0	1	0
374	41	0	1	6	0	999	0	1	1	1	0	0	0	3	0	999	1	1	2	1	1	1	999	1	2
375	43	0	1	6	1	2	0	1	0	999	0	0	0	1	0	999	2	1	2	1	2	1	999	1	2
376	33	0	1	6	1	6	0	1	0	999	0	0	0	1	0	999	2	0	999	999	999	999	2	0	999
377	32	0	1	6	1	10	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
378	39	0	1	6	1	20	0	0	999	999	999	999	999	0	0	999	2	1	3	0	999	999	999	0	999
379	34	0	1	6	0	999	0	0	999	999	999	999	999	0	0	999	0	1	3	0	999	999	999	0	999
380	29	0	0	6	1	3	0	1	1	0	0	0	0	2	0	999	0	0	999	999	999	999	2	0	999
381	32	0	1	6	1	30	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	0	1	2
382	34	0	1	6	1	5	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
383	26	0	0	6	1	2	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	1	0

QNO	AGE	GENDER	MARSTAT	EDU	PASTDON	NUMDON	APHER	HRDMSD	PURPOSE	NEEDMSD	RISK	TESTREQD	HRDRGSRY	SCORE	KLEVEL	ENROLLD	WILLNG	WLLNGNOW	WHONOW	JOINNOW	RPTNOW	BLDALSO	REASON	OPINION	WHOSEOPN
384	36	0	1	6	1	10	0	1	1	0	0	1	1	4	1	0	2	1	2	1	1	1	999	1	6
385	33	0	1	6	1	4	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	0	999
386	23	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
387	24	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
388	25	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
389	28	0	0	6	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
390	32	0	1	6	1	2	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
391	38	0	1	6	1	2	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
392	28	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	1	1	2	1	2	1	999	0	999
393	25	0	0	6	1	7	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
394	22	0	0	6	1	4	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
395	25	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999
396	22	0	0	6	1	3	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
397	26	0	1	6	1	4	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	3	0	999
398	30	0	1	6	1	2	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
399	40	0	1	5	1	3	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
400	33	0	1	6	1	5	0	0	999	999	999	999	999	0	0	999	2	1	0	0	999	999	999	0	999
401	30	0	1	4	1	1	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	2	0	999
402	33	0	1	6	1	8	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	3	0	999
403	43	0	1	6	1	3	0	0	999	999	999	999	999	0	0	999	0	0	999	999	999	999	3	0	999
404	41	0	1	6	1	5	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	2	0	999
405	25	0	0	6	1	10	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	0
406	35	0	1	5	1	2	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	1	2
407	34	0	1	6	1	5	0	0	999	999	999	999	999	0	0	999	1	2	999	999	999	999	4	0	999
408	19	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
409	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
410	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
411	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	2	0	999
412	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	5
413	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	0	999
414	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	3	1	5
415	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	2	0	999
416	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
417	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	1	2	1	2	1	999	0	999
418	20	0	0	5	1	1	0	0	999	999	999	999	999	0	0	999	2	1	2	1	1	1	999	0	999
419	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
420	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	0	999	999	999	999	1	1	6
421	18	0	0	5	0	999	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	1	0	999
422	19	0	0	6	1	1	0	0	999	999	999	999	999	0	0	999	2	2	999	999	999	999	4	0	999

VARIABLES/ QUESTION (CODE)	RESPONSE CODE
Age of the donor in years (AGE)	Digit represents age in years
Gender of the donor (GENDER)	0- Male , 1- Female
Marital Status (MARSTAT)	0 – Unmarried , 1- Married
Education level of the donor (EDU)	7-Profession/Honours, 6-Graduate/postgraduate 5-High school diploma 4-High School 3-Middle school 2-Primary school 1-Illiterate
Have you donated blood before? (PASTDON)	0-No ,1-Yes
No. of units of blood donated (NUMDON)	Digit - represents number of units donated 999- Not applicable
Have you donated blood components by apheresis? (APHER)	0-No , 1-Yes
Have you heard about marrow stem cell donation? (HRDMSD)	0-No , 1-Yes
Do you know for what purpose marrow stem cells are donated?(PURPOSE)	0-No,1-Yes, 999- Not applicable
Is there any person known to you who needs/has needed marrow stem cells as treatment? (NEEDMSD)	0-No, 1-Yes, 999- Not applicable
Do you know about the risks involved in marrow stem cell donation procedure? (RISK)	0-No, 1-Yes, 999- Not applicable
Do you know what important test is done before marrow stem cells are donated? (TESTREQD)	0-No , 1-Yes , 999- Not applicable
Have you heard about registry for unrelated adult marrow stem cell donors? (HRDRGSRY)	0-No , 1-Yes , 999- Not applicable
Score obtained by donor in knowledge assessment (SCORE)	Digit represents score obtained
Level of knowledge (KLEVEL)	0-Belowdesirable, 1-Desirable
Have you registered at such a registry? (ENROLLD)	0-No, 1-Yes, 999- Not applicable

VARIABLES/ QUESTION CODE	RESPONSE CODE
Before information - Are you willing to donate marrow stem cells? (WILLNG)	0-No, 1-Yes, 2-Not sure
After information- Are you willing to donate marrow stem cells? (WLLNGNOW)	0-No, 1-Yes, 2-Not sure
If yes, to whom? (WHONOW)	0-Related persons 1-Knownunrelated persons 2-Anyone in need 3-Related & known unrelated persons 999-Not applicable
If given an opportunity, are you willing to join stem cell registry and donate marrow stem cells to an unrelated person? (JOINNOW)	0-No, 1-Yes, 2-Not sure 999-Not applicable
If yes, are you willing to donate more than once if necessary? (REPEATNOW)	0-No, 1-Yes, 2-Not sure, 999-Not applicable
Are you willing to donate blood, if needed, for the same patient? (BLDALSO)	0-No, 1-Yes, 2-Not sure 999-Not applicable
If no or not sure about willingness to donate, give reasons: (REASON)	0-need to discuss with family 1-risk/fear of side effects 2-not interested 3-need to know more 4-absence from work 6-need to grow older to decide 7-concern for fitness to donate later, in future 8-both 1 & 4 9-concern about personal situation 10-PBSC donation requiring 5 days of injection prior to donation 11-duration of donation procedure 12-apheresis-related complications 13-dependence of family members on the donor 999-Not applicable
Do you think other's opinion may make you change your decision? (OPINION)	0-No, 1-Yes
If yes, whose opinion? (WHOSEOPN)	0-parent(s), 1-sibling(s), 2- spouse, 3-friend, 5-person who has already donated, 6-others, 7-0,1&2, 8-0&1, 9-0&2